

VIRTUAL ARCHAEOLOGY · STUDYING PREHISTORIC VIOLENCE · TALES OF ANCIENT TEXTILES

american archaeology

WINTER 2012-13

a quarterly publication of The Archaeological Conservancy

Vol. 16 No. 4

SOLVING THE MYSTERY OF CHACO CANYON?



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Explore Ireland's prehistoric and early Christian sites with Prof. Charles Doherty, U. College Dublin. Touring will span thousands of years as we study Neolithic and Bronze Age monuments and artifacts, Celtic defensive systems and stone forts. Highlights include prehistoric Newgrange and Knowth; Dun Aengus fort on the Island of Inishmore; Ring of Kerry; Clonmacnoise monastic settlement; Dublin and Belfast. Our tour is enhanced by traditional music and dance performances and lectures by local archaeologists.

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COVER FEATURE

26 CHACO, THROUGH A DIFFERENT LENS

BY MIKE TONER

Southwest scholar Steve Lekson has taken an unconventional approach to solving the mystery of Chaco Canyon.

12 VIRTUALLY RECREATING THE PAST

BY JULIAN SMITH

Virtual archaeology has remarkable potential, but it also has some issues to resolve.

19 A ROAD TO THE PAST

BY ALISON MCCOOK

A dig resulting from a highway project is yielding insights into Delaware's colonial history.

33 THE TALES OF ANCIENT TEXTILES

BY PAULA NEELY

Fabric artifacts are providing a relatively new line of evidence for archaeologists.

39 UNDERSTANDING PREHISTORIC VIOLENCE

BY DAN FERBER

Bioarchaeologists have gone beyond studying the manifestations of ancient violence to examining the conditions that caused it.

CHAZ EVANS



45 new acquisition

A TRAIL TO PREHISTORY

The Conservancy saves a trailhead leading to an important Sinagua settlement.

46 new acquisition

NORTHERNMOST CHACO CANYON OUTLIER TO BE PRESERVED

Carhart Pueblo holds clues to the broader Chaco regional system.

48 point acquisition

A GLIMPSE OF A MAJOR TRANSITION

Herd Village could reveal information about the change from the Basketmaker III to the Pueblo I phase.

RICHARD LEVY



2 LAY OF THE LAND

3 LETTERS

5 EVENTS

7 IN THE NEWS

- New Information on Kennewick Man
- Maya Royal Tomb Discovered
- Viking Outpost in Canada

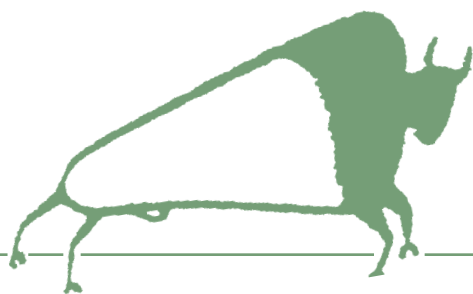
50 FIELD NOTES

52 REVIEWS

54 EXPEDITIONS

COVER: Pueblo Bonito is one of the great houses at Chaco Canyon. Though archaeologists have studied Chaco for decades, there is still no consensus as to what it was, but Southwest scholar Steve Lekson believes he has solved the mystery.

CREDIT: Branson Reynolds



Lay of the Land

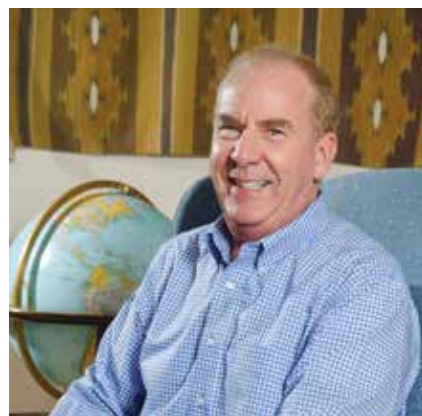
Solving The Mystery Of Chaco

The great ruins in Chaco Canyon in northwestern New Mexico, along with the more than 100 Chaco outliers that are up to 100 miles away from the center, present archaeologists with a difficult problem. Or better said, a series of difficult problems. After a century of intensive study, there is not yet a consensus as to the very nature of this “Chaco phenomenon.” It is very different from all the other architecture of its time—bigger, grander, and more complex. Yet it now appears that the large structures of Chaco Canyon were sparsely inhabited.

In this issue of *American Archaeology* (see “Chaco, Through A Different Lens,” p. 26), we focus on a new general theory for Chaco Canyon put

forth by Stephen Lekson of the University of Colorado. Known as a brilliant researcher and controversial theorist, Lekson likes to think outside of the box. For a century, archaeologists have seen Chaco Canyon through the context of modern Pueblo people projected back in time. Lekson challenges this ethnographic bias. Instead he now argues, convincingly in my view, that Chaco Canyon is linked to Mexico and reflects a local adaptation of a well-established Mexican system known as the *altepetl*.

So how is this conflict to be resolved? Are we ever to reach a scientific consensus as to the nature of the Chacoan culture? The answer is to conduct new research using the most modern technology, including DNA studies



Mark Michel, President

of people from Chaco Canyon. Pueblo Bonito, Chetro Ketl, and the other great houses of downtown Chaco have hardly been touched by scientists for 75 years. Research on the Chaco outliers is minimal. A new well-funded, long-term research project using the latest theories and technology can solve this mystery once and for all. The National Park Service, which owns Chaco Canyon, should step up to the challenge.

Mark Michel

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Letters

A Solutrean Fan

The letter "Skeptical of the Solutrean Hypothesis" by Dixie Dringman in the Fall 2012 issue is a nasty and scathing diatribe against Dennis Stanford and gives no facts whatsoever to support her claim. As a Passport in Time volunteer I worked on many projects and was extremely fortunate to work on one with Dennis Stanford. I found him to be a fine archaeologist and a very ethical person. The time Stanford took from the project to assist novices such as myself was invaluable. As a Solutrean hypothesis and Dennis Stanford fan, I thank you.

*Francis E. Hopton
Little Compton, Rhode Island*

A Wonderful Place

I just read "Striving For Perfection" (Fall 2012), the article about the Shaker village at Pleasant Hill, Kentucky. I grew up in Harrodsburg, just 10 miles from Pleasant Hill, and remember driving Highway 68 to Lexington, which at that time ran right down the middle of the village. The beautiful old buildings



on each side of the road, even in their ramshackle state, were always fascinating.

It's a wonderful place to vacation with many historic interpreters and activities, a wonderful restaurant where they serve food from Shaker recipes and the guest rooms are furnished with Shaker-style furniture, much of it made right there. I highly recommend it as a place to step back to a simpler, kinder era.

*Deb Botner Sims
Winter Park, Florida*

Editor's Corner

For some time modern technology has proven itself instrumental in revealing the past. But over the last 15 or 20 years technology has gone beyond revealing to recreating ancient times. Virtually recreating them, that is. (See "Virtually Recreating the Past," page 12.)

Archaeologists, in collaboration with other researchers, are using fragmentary archaeological data and, with the help of 3-D laser scanners, sophisticated computers, and other equipment, making those fragments whole. They are recreating artifacts, buildings, cities, landscapes. Historical battles can be fought again, ancient events reenacted. Researchers can create avatars that interact with other researchers' avatars in the recreated environment of a place a thousand miles and a thousand years distant.

The practice of virtual archaeology is becoming increasingly sophisticated, and the technology that produces it is becoming less expensive. But as our article explains, there are various obstacles that still need to be overcome. And for various reasons, archaeologists in the U.S. have been much slower to embrace it than their colleagues abroad. Perhaps that will change in the near future.

Michael Bawaya

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American Archaeology is the only popular magazine devoted to presenting the rich diversity of archaeology in the Americas. The purpose of the magazine is to help readers appreciate and understand the archaeological wonders available to them, and to raise their awareness of the destruction of our cultural heritage. By sharing new discoveries, research, and activities in an enjoyable and informative way, we hope we can make learning about ancient America as exciting as it is essential.

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The Archaeological Conservancy,
5301 Central Avenue NE, Suite 902,
Albuquerque, NM 87108-1517;
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PUBLISHER: Mark Michel

EDITOR: Michael Bawaya (505) 266-9668, tacmag@nm.net

ASSISTANT EDITOR: Tamara Stewart

ART DIRECTOR: Vicki Marie Singer, vicki.marie@comcast.net

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5301 Central Avenue NE, Suite 902, Albuquerque, New Mexico 87108;
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❖ NEW EXHIBITS



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Anchorage Museum

Anchorage, Alaska—The museum's permanent 15,000-square-foot Alaska Gallery is devoted to Alaska's history, displaying more than 1,000 objects and considered one of the finest presentations of Alaskan history and ethnology in the state. Full-scale and miniature dioramas and stunning artifacts provide a look at the early lifestyles of Alaska's native peoples. Other gallery topics include exploration and settlement by the Russians, the gold rush era, World War II, and statehood. (907) 929-9200, www.anchoragemuseum.org (Permanent exhibit)

National Museum of the American Indian – George Gustav Heye Center

New York, N.Y.—Chosen to illustrate the geographic and chronological scope of the museum's collection, the new permanent exhibit "Infinity of Nations: Art and History in the Collections of the National Museum of the American Indian" includes some 700 works of native art from throughout North, Central, and South America, demonstrating the breadth of the museum's renowned collection and highlighting the historic importance of many of these iconic objects. On display are artifacts that represent each region, including an Apsaalooke (Crow) robe illustrated with warriors' exploits, a detailed Maya limestone bas relief depicting a ball player, an elaborately beaded Inuit woman's parka, a Mapuche hand drum depicting the cosmos, a water vessel from Peru, a Chumash basket decorated with a Spanish-coin motif, an ancient mortar from Pueblo Bonito in Chaco Canyon, N.M., and other stunning objects. (212) 514-3700, www.americanindian.si.edu (Permanent exhibit)

AMERICAN INDIAN MUSEUM/SMITHSONIAN

Florida Museum of Natural History

University of Florida, Gainesville—The interactive exhibit "Dugout Canoes: Paddling through the Americas" displays American dugouts from ancient times to the present. Learn how dugout canoes have affected life and travel throughout the Americas, from Florida to the Amazon and the Pacific. Dugout canoe finds are rare and not always recorded. The oldest known dugouts in North America date to 6,000-7,000 years ago. (352) 846-2000, www.flmnh.ufl.edu/exhibits (Through November 2013, then traveling to other venues)

Amerind Foundation

Draughton, Ariz—"Interwoven Traditions: the Cultural Legacy of Southwestern Textiles" is a new long-term exhibit featuring beautiful rugs and other textiles from the Amerind's extensive collection, including some real treasures from Navajo, Hopi, Tarahumara, Rio Grande, and other weavers. Diné masterweaver Barbara Teller Ornelas joined with Amerind's curator Eric Kaldahl to choose the pieces for exhibition. (502) 586-3666, www.amerind.org (New two-year exhibit)





Cleveland Museum of Natural History

Cleveland, Ohio—The secrets of an ancient world await as you enter Palenque, Mexico, where the Maya prospered for thousands of years. In the museum's new exhibit "The Mystery of the Mayan Medallion," an archaeological team has mysteriously disappeared from a dig site while investigating rumors of a priceless jade medallion buried in the ruins. Parents and children can follow the clues the team left behind to locate the precious medallion. Don't forget to heed the warning signs to avoid the same fate. This exhibit uses the mystery and intrigue of the Maya empire to explore math, science and history in a unique and interesting way sure to capture the attention of all who visit. (800) 317-9155, www.cmnh.org (January 26-May 5, 2013)

CLEVELAND MUSEUM OF NATURAL HISTORY

University of Oregon

Museum of Natural and Cultural History Eugene, Ore.—Experience 15,000 years of Northwest cultural history and 200 million years of geology through the exhibition "Oregon – Where Past is Present." People have been living in Oregon for more than 14,000 years, and the stories of their diverse cultures are preserved in oral traditions passed from generation to generation and in the objects people used and valued. The arrival of European Americans challenged the continuity of native traditions, but in spite of everything, they have survived. Today, Oregon is experiencing a revival of native culture as people work to preserve languages, arts, and traditions that were nearly lost. The exhibit includes objects that range in age from some of the oldest occupations to baskets and beadwork of the 19th and 20th centuries. (541) 346-3024, <http://natural-history.uoregon.edu/exhibits> (Long-term exhibit)

❖ CONFERENCES, LECTURES & FESTIVALS

2012 Maine Indian Basketmakers Sale and Demonstration

December 8, Collins Center for the Arts, University of Maine, Orono. This free event features Maliseet, Micmac, Passamaquoddy, and Penobscot basketmakers selling their hand-made, ash splint, and sweetgrass basketry. Workbaskets such as pack and potato baskets, and fancy baskets ranging from strawberry and blueberry-shaped baskets to curly bowls may be found along with quill jewelry, woodcarvings, and birchbark work. Traditional music, demonstrations, drumming, and dancing will also be presented. (207) 581-1901, www.umaine.edu/hudsonmuseum

Pueblo Grande Museum Indian Market

December 8, Pueblo Grande Museum and Archaeological Park, Phoenix, Ariz. This year's market features top Native American artists selling hand-made items such as paintings, sculptures, jewelry, and basketry. Music and dance performances will be held throughout the weekend, as well as artist demonstrations and traditional native foods. (602) 495-0901, www.pueblogrande.com

The Art of Southwestern Basketry and Textiles

January 11-12, Amerind Foundation, Dagoon, Ariz. Join legendary Southwest weaving expert Terry DeWald for a three-day intensive workshop on Southwestern baskets and textiles. Participants will stay in Amerind's Fulton Seminar House and meet in the research library for intensive study of Southwest weaving traditions. The course will utilize the superb basketry and textile collections of the Amerind Foundation, but participants are encouraged to bring elements of their own collections as well. (520) 586-3666, www.amerind.org

Heard Museum World Championship Hoop Dance Contest

February 9-10, Phoenix, Ariz. Experience the fast-paced precision and grace of hoop dancing at the World Championship Hoop Dance Contest, where more than 70 top native hoop dancers from the United States and Canada compete for the championship and cash prizes. The tradition of dancing with a hoop has an extensive history among native people, to whom the hoop or circle is symbolic, representing the circle of life and the continuous cycle of summer and winter, day and night, male and female. (602) 252-8848, www.heard.org

Caddo Conference

February 22-23, Gilcrease Museum, Tulsa, Okla. The annual conference includes poster and paper presentations on recent research in the Caddo archaeological region, including southwestern Arkansas, northwestern Louisiana, southeastern Oklahoma, northeastern Texas, and adjacent areas. The conference seeks to promote and stimulate interest in the archaeology, history, and ethnology of the region. www.caddoconference.org



ARIZONA STATE MUSEUM

Southwest Indian Art Fair

February 23-24, Arizona State Museum, the University of Arizona, Tucson. More than 200 native artists will display top-quality, handmade pottery, Hopi katsina dolls, paintings, jewelry, baskets, rugs, blankets, and other items. Artist demonstrations, native food, music, and dance performances will also be featured. (520) 626-5886, www.statemuseum.arizona.edu/events/swiaf



Evidence of Norse in Arctic Canada

Archaeologists working on Baffin Island believe they've found a Norse outpost.

A team of researchers has uncovered evidence of what they believe is a Norse shore station while excavating the ruins of an ancient structure on Baffin Island in the Canadian Arctic. Patricia Sutherland, who is directing the project, has been investigating the question of interaction between early Europeans and aboriginal occupants of the region for some time.

"I've been looking at four sites, three on Baffin Island and one in northern Labrador since 1999, when I identified cordage at the Museum of Civilization that was directly comparable to cordage from Norse Greenland," said Sutherland, an adjunct professor at Memorial University of Newfoundland and Research Fellow at the University of Aberdeen in Scotland. This cordage, previously excavated by another researcher from one of the sites and stored at the museum, began a 13-year pursuit for other evidence of the Norse in the Canadian Arctic.

The Norse, popularly known as the Vikings, visited North America centuries before the arrival of Christopher Columbus, yet only one site in the Americas, the 1,000-year-old L'Anse aux Meadows on the northern tip of Newfoundland, has been confirmed as a Norse outpost. In the 50 years following the discovery of this base camp, researchers and amateur historians have scoured North America's east coast searching for evidence of the Norse, meeting with little success until recently.



Researchers excavate at Cape Tanfield, one of the sites investigated by Patricia Sutherland.

Other artifacts in addition to cordage recovered from the sites include notched wooden objects similar to tally sticks used by the Norse for recording trade transactions, and distinctive bar-shaped whetstones used for sharpening metal tools. Traces of metals including the copper alloy bronze, known to have been produced and used by the Norse, have been found on the surfaces of the stones. Over the course of her project Sutherland has examined a large number of artifacts stored at the Canadian Museum of Civilization and The Rooms Museum in Newfoundland, comparing them with medieval Norse artifacts in museums in Denmark, Greenland, Iceland, Britain, and Russia.

"I certainly believe that we have

the evidence," said Sutherland. "There is very little doubt the architecture is European, based on the remnants of a rock-lined floor drain and the size and composition of the walls, which are comparable to Norse structures. And the whetstones, in particular, are very convincing."

University of Waterloo archaeologist Robert Park recently challenged the dating of the Baffin Island artifacts and Sutherland's interpretations of the evidence, arguing that the most plausible explanation for the Norse-like artifacts and architecture is that these were developed independently of any Norse influence by northern Canada's ancient indigenous inhabitants.

—Tamara Stewart



Maya Queen's Tomb Discovered

Lady K'abel was one of the great queens of the Classic Maya.



EL PERÚ-WAKA' ARCHAEOLOGICAL RESEARCH PROJECT

Olivia Navarro-Farr excavates the tomb of Lady K'abel, one of the great queens of Classic Maya civilization.

Archaeologists excavating the ancient Maya city of El Perú-Waka' in northern Guatemala have discovered the likely tomb of Lady K'abel, a seventh-century Holy Snake Lord, who was one of the great queens of Classic Maya civilization. "It's an extremely important discovery" because Queen K'abel was a notable figure, and it's very rare in Maya archaeology to find historical identification in a tomb, said David Freidel of Washington University in St. Louis, the co-director of the archaeological project.

The royal tomb contained an alabaster jar inscribed with the name K'abel and other glyphs that mean "holy snake princess," "her house," and "precious substance," according to project epigrapher Stanley P. Guenter. Shaped like a conch shell with an old woman emerging from it, images on the lidded white jar were highlighted with cinnabar, a red ore that was also used to stain the bones of royalty.

Queen K'abel was the daughter of the emperor of the Snake Dynasty, who was based in the capital city of Calakmul, in what is now Mexico. She married K'inich Bahlam II, the King of El Perú-Waka', and was the military ruler of the Wak kingdom, part of her family's empire, for at least 20 years from A.D. 672–692. Her authority was greater than her husband's.

The tomb was discovered in June by a team of

archaeologists directed by Olivia Navarro-Farr, of the College of Wooster in Ohio. The Guatemalan army protected the tomb from looters for 10 days while the contents were excavated. The tomb was built into a staircase that had been covered by later construction. A platform above the tomb had been used as a shrine for about 200 years after the Wak kingdom collapsed, and researchers have been trying to understand what was being revered there, and they now assume it was the queen's tomb.

"We can now say that this burial was pretty significant to social memory. She was regarded with a great deal of reverence," Navarro-Farr said. "This very important female will prove crucial in furthering our understanding of the influence that women wielded in Classic Maya politics."

The tomb was remarkably intact, even though the vaulted ceiling had collapsed. The skeleton was resting on a wooden pallet covered in red cloth on a raised bench along one wall of the plastered chamber. The long bones were stained red.

Although they have not yet been able to confirm the sex through skeletal analysis, researchers believe it was a female because a large red *Spondylus* shell, part of a shell ornament used to adorn girdles, was found on the front of the torso. That type of shell was only worn by queens in their stela depictions at El Perú-Waka', Freidel said. —*Paula Neely*

U.S. Repatriates Thousands of Artifacts to Mexico



The cache is the largest number of items Immigration and Customs Enforcement has returned to any country.

U.S. Immigration and Customs Enforcement (ICE) recently repatriated over 4,000 stolen pre-Columbian artifacts to Mexico, including statues and figurines, pottery, metates and manos, an Aztec whistle, copper hatchets, rabbit sticks, sandals, and spears.

The cache is the single largest haul of objects that the agency has returned to any one country, according to ICE. More than 2,600 items had been repatriated to 24 countries since 2007. The artifacts were recovered through undercover and sting operations conducted by special agents of ICE's Homeland Security Investigations (HSI) in coordination with Mexican law enforcement agencies. "The plundering of cultural property is one of the oldest forms of organized cross-border crime and has become a worldwide phenomenon that transcends frontiers," said HSI Assistant Director Janice Ayala.

HSI special agents seized 26 items that are more than 1,500 years old following an investigation in Kalispell, Montana, that involved an art dealer who paid members of the Tarahumara tribe to loot artifacts from burial caves in the Copper Canyon area of Chihuahua, Mexico, so that he could sell them in a local art gallery. In Alpine, Texas, HSI agents recovered 200 artifacts that were allegedly smuggled into the U.S. after they were stolen from a private collection and museum in Cuatro Ciénegas, Coahuila, Mexico.



U.S. Customs and Border Protection inspectors seized this clay anthropomorphic statue that dates to the first millennium A.D.

The artifacts were also interdicted at ports of entry to the United States with assistance from U.S. Customs and Border Protection. Statues were discovered during an inspection of a bus passenger at the Lincoln-Juarez Bridge Port of Entry, and in vehicles entering Del Rio, Texas. Undeclared metates and manos, were found in vehicles entering Naco, Arizona. Objects were also illegally shipped and mailed into the U.S. A clay anthropomorphic statue that dates to A.D. 1000 and a Chinesco-style figurine from Nayarit, Mexico, were intercepted at Chicago, and two copper hatchets shipped from Sweden were discovered at San Diego International Airport.

Consul General of Mexico Jacob Prado expressed gratitude for the return of the objects and stated that the restitution "is proof of the excellent collaboration that exists between Mexico and the United States." A U.S.-Mexico treaty of cooperation regarding the recovery and return of stolen archaeological, historical, and cultural properties restricts the importation of pre-Columbian artifacts and colonial-era religious objects into the United States without proper export documents. —Paula Neely



This roughly 1,500 year-old pot was looted from burial caves in the Cooper Canyon area of Mexico.



Excavation Of 2,000-Year-Old Bison-Kill Site Raises Concerns

Archaeologists and Crow tribe considering investigation.



MATT ROWE

This pile of bison bones will eventually be removed and subsequently reburied.

Archaeologists and Crow tribal members are investigating a recent excavation of the Sarpy Creek bison-kill site on tribal land in Montana. The excavation resulted from Westmoreland Resources, Inc.'s intention to expand their Absaloka Coal Mine. The site is estimated to contain the remains of hundreds, or possibly thousands, of butchered bison, as well as spear and projectile points dating back to the late Archaic period.

Between 2010 and 2011, archaeologists with GCM Services, which was hired by Westmoreland, excavated the site using a backhoe and power-screening equipment in accordance with a data recovery plan that was created in consultation with the mining company, then-director of the Crow Tribal Historic Preservation Office (THPO) Dale Old Horn, the Bureau of Indian Affairs, and the Office of Surface Mining. "An

ancient bone bed of such significance should not have been approached with a backhoe and power-screening tools," said Judson Finley, an archaeologist at Utah State University who is familiar with the site.

GCM Services and Westmoreland have said that no corners were cut and they complied with the data recovery plan approved by the Crow Tribe. But Burton Pretty on Top, the director of the Crow culture committee, has stated that Old Horn signed off on the plan without consulting with other Crow officials. The plan recommended that only two percent of the site be excavated and the remainder be removed by backhoe, with spear points and tools collected for analysis.

The site is one of the largest known bison kill and butchering areas in the northern Plains, and it's considered sacred by many Crow tribal members.

The remaining 98 percent of the bones are piled up several feet high next to the excavated pits where they await removal, storage, and reburial.

"The archaeological community has not seen such a travesty in at least 50 years or more," said Finley, who contends it would have been feasible to avoid the site. "This breakdown in the Section 106 process draws the attention of the archaeological community to flaws in the process that are particularly pressing in regards to energy development on tribal lands."

Martin McAllister of Archaeological Damage Investigation and Assessment in Missoula, recently visited the site at the tribe's behest in order to conduct a preliminary assessment. If hired, the firm would conduct an archaeological damage assessment and review the possible legal consequences.

—Tamara Stewart

New Information About Kennewick Man

Studies shed light on ancient remains.

Scientists studying the 9,500-year-old Kennewick Man are beginning to reveal what they've learned about one of North America's oldest and most controversial skeletons. The scattered remains were discovered in the water and along the banks of the Columbia River near Kennewick, Washington, in 1996.

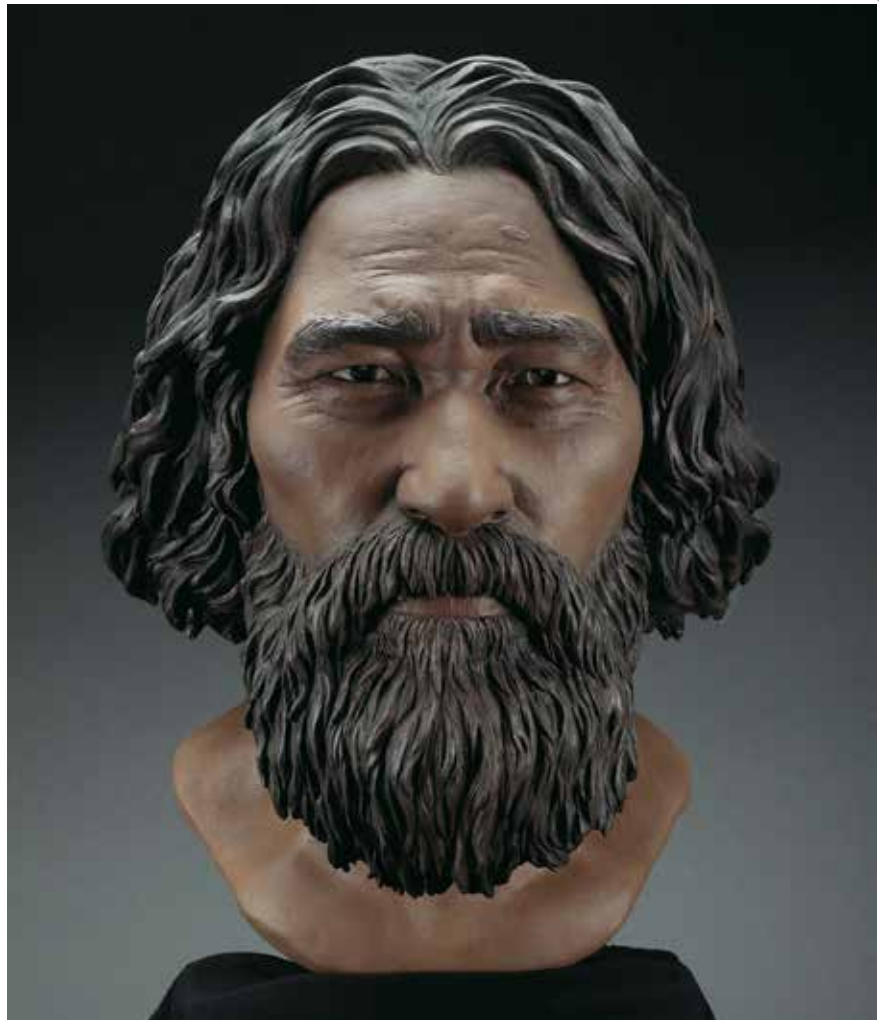
"It's the most important skeleton that's been found in North America. It speaks volumes about what life was like during his time period," said Douglas Owsley, division head of physical anthropology at the Smithsonian's National Museum of Natural History. Owsley has led the study since 2004, after scientists won a long legal battle to study the remains, which Native American tribes in the Columbia Plateau had tried to claim for reburial without scientific study.

He recently, with science writer Sally Walker, co-wrote *Their Skeletons Speak, Kennewick Man and the Paleo-american World*, a book that provides a general overview of the research findings for middle and high school students and the public. More detailed research results will be published in a scientific volume in about a year.

Owsley said the shape of Kennewick Man's skull is most similar to Polynesians, and he also bears a slight resemblance to the Ainu, a reflection of shared roots with the distant ancestors of these east Asian populations. "He does not have the same craniofacial features seen in North American Indians. The difference is striking and I don't see an easy connection between these groups," he said.

Although there have been previous estimates of his stature, the team used more modern methodology and determined that Kennewick Man was 5'7" and weighed about 160 pounds. His legs were powerful, like those

american archaeology



This Kennewick Man facial reconstruction by StudioEIS and forensic sculptor Amanda Danning is based on evidence from the studies.

of a soccer player, and his right arm was exceptionally strong from spear throwing.

The study also suggests that Kennewick Man could have come from the Pacific Coast, not inland, where his remains were found. Scientists have learned from stable isotopes in his bones that during the last 10 years of his life he consumed a diet heavily dependent on marine resources, particularly fish and high trophic-level animals such as seals, from the Pacific Ocean. Scientists don't know how he

died, but "He was intentionally buried by people who disposed of his remains in a caring manner," Owsley said. Mineral deposits that formed on bones and glued bones together, along with other evidence, indicate that he was interred on his back with his legs extended and his arms at his side.

When he was in his late-teens or early 20s he was speared in his right hip. "It knocked the stuffing out of him," Owsley said. "If it had been an inch over, it would have killed him."

—Paula Neely





VIRTUALLY *Recreating the Past*



Inuit elders wearing 3-D glasses view computer reconstructions of a Thule whalebone house at a virtual reality theatre called a CAVE at the University of Calgary. The elders were able to experience life as lived by their ancestors.

PETER DAWSON

VIRTUAL ARCHAEOLOGY HAS AMAZING CAPABILITIES, BUT THERE ARE PROBLEMS TO BE SOLVED BEFORE IT CAN REACH ITS POTENTIAL.

BY JULIAN SMITH

Peter Dawson, an archaeologist at the University of Calgary, was working on a *Iglyryauq*, a traditional sod house built in the 19th century by the Siglit-Inuvialuit culture of the western Canadian arctic. The interiors were dimly lit by seal-oil lamps, and he wanted to see if activities that needed more light, such as sewing, took place in the

brighter parts of the structure. When his team compared light intensity values with a frequency distribution of artifacts, he says, "sure enough, we found a high correlation between the presence of artifacts like awls and needles and light sources."

The most interesting part of the experiment was that

none of it really existed—the dwelling, the artifacts, even the light from the lamps, were all 3-D digital models in a computer. The parameters of the incredibly detailed recreation could be changed, fine-tuned, even scrapped and started over, all far from the frigid expanse of the Canadian arctic. “That’s the kind of thing you could never do with a 2-D drawing,” Dawson says.

Recent leaps in technology have brought virtual archaeology into the mainstream. Researchers are using 3-D data captured on-site to build virtual models of artifacts, sites, landscapes, and cities, which can then be used to test hypotheses with a few clicks of a mouse. By almost every metric, virtual archaeology is becoming cheaper and easier: computing power is skyrocketing, prices for digital storage and tools such as laser scanners are falling, and many popular 3-D modeling programs are available for free. The expertise and equipment of video games and movie special effects are spilling over into academic projects. Constantly expanding Internet access on ever-smarter phones and tablet computers makes it possible to share the digitized information with colleagues and the public, sometimes in the form of educational video games with computer-controlled characters with which to interact.

At the same time, rapid progress always brings new challenges, and in the case of virtual archaeology these are both technological and cultural. In May, the High-Tech Heritage Conference at the University of Massachusetts Amherst addressed recent advances and hurdles in the burgeoning field. Maurizio Forte of the University of California, Merced, a pioneer in the field, was the keynote speaker. “Every field season we collect terabytes of information from digital tools,” he says. “It’s an amazing change. This technology can change archaeology.”

In 2011-12, Forte and his students made a 3-D model of Fort Ross, a 19th-century Russian fur-trading outpost (now a state park) on the northern California coast. Using laser scanners that can capture 300,000 3-D data points every second, they recorded the insides and outsides of buildings, artifacts like baskets and Indian dolls, and even some of the surrounding landscape. The result is the Fort Ross Virtual Warehouse Project, an interactive educational game aimed at students, teachers, and visitors.

The player assumes the identity of Vasilii Starkovskii, a clerk at the fort in colonial times, and has to use information gathered during the game to complete a series of missions, from repairing a windmill to trading goods with natives. This might involve learning the Russian names for certain items or interacting with one of half a dozen virtual characters such as an Aleut hunter, a blacksmith, a Spanish monk, or the clerk’s supervisor.

The web-based game is in testing stages and planned for release by the end of 2012. Although the current version is only for one player, Forte says future versions could permit multiple players. By immersing users in a specific place and time with individualized characters, he says, the interactive

game will use our natural addiction to narrative to convey the site’s historical importance in a way even a real-life visit might not. “People like to visit, but many times they don’t understand what’s there,” Forte says. “They just watch and walk.” The game’s eventual fate, including the possibility of commercial release, depends on state funding.

While the Fort Ross project is meant for the general public, Forte’s work at the Maya ruins of Copán in Honduras is aimed squarely at scholars. It’s part of MayaArch3D, a larger project involving teams of researchers and cultural heritage managers around the world. Started in 2009, the project’s overarching goal is to develop new tools for collaborating on digital projects and sharing archaeological data about the Maya online. It’s focused on Copán, starting with a relatively low-resolution recreation of Copán’s landscape and buildings during the Late Classic period. There are also specific high-resolution 3-D models of the site that are based on millimeter-precise laser scans and digital photogrammetry of buildings and sculptures from the reign of Waxaklajuun Uâ’baah Kâ’awil, Copán’s 13th ruler (A.D. 695-738).

Forte’s team has been working to recreate one of the scanned buildings, Temple 22 on the East Court—a tricky assignment, since much of it is in ruins. The temple was built in A.D. 715 without mortar, so when outer layers of plaster eroded, the intricate sculptures on its upper façade fell victim to looters, earthquakes, and time. Only the first story stands today, and thousands of pieces of the sculptures have been removed to museums around the world.

Using data ranging from high-resolution scans of existing sculptures to building elevations and 2-D photos, Forte’s team is creating a “hypothetical reconstruction” of the temple. They’re also trying to re-create how the sky over the temple looked in the Late Classic period of Copán, using a piece of open-source software called Stellarium, to see if the buildings were designed to align with astronomical events.



A virtual reconstruction of the interior of a 19th-century Inuit sod house that's illuminated by seal oil lamps, as it was in the past.

RICHARD LEVY



Peter Dawson and his team created a virtual model of Fort Conger based on 3-D laser scanning that they did at the remote site on Ellesmere Island in the Canadian arctic.

Eventually they plan to incorporate input from researchers around the world, making the reconstruction a collaborative effort instead of a one-time static model. This will be possible thanks to TeleArch, one of the most advanced systems of teleimmersive archaeology in the world, according to Forte. Teleimmersive archaeology allows multiple users to work in a 3-D cyber space as human avatars sharing data, models, and interactions in real time.

This is an important distinction to Forte, who draws a line between virtual archaeology, where the focus is on rendering static 3-D images, and what he calls “cyber archaeology,” which is mutable and fully immersive. Cyber archaeology models can be constantly tweaked and improved as researchers collaborate and critique each others’ contributions. Users experience the digital environments as avatars, like the Russian clerk at Fort Ross, and can do more than just look around; they can interact with each other, perform tasks, or play games. The eventual result would be similar to popular online role-playing games like World of Warcraft, he says, with its endless realms to explore and characters to interact with. (In fact, Forte has taught archaeology in the early online virtual world Second Life.)

“If the keyword in virtual archaeology is ‘seeing,’ in cyber archaeology it’s ‘playing,’” he says. “The real challenge now is not so much the model itself—it’s the interactivity, seeing what we can do in that environment.”

At the other end of North America, Peter Dawson and Richard Levy of the University of Calgary have been working to create interactive digital models of two american archaeology



Dawson stands next to one of Robert Peary’s three huts at the real Fort Conger.

different kinds of indigenous dwellings. One was the Iglyry-auq sod house, based on archaeological data and a drawing made by a 19th-century British explorer. The other was a whalebone dwelling built by the Thule culture, the ancestors of today’s Inuit, between the 13th and 16th centuries. The exact design has been lost to time, but archaeologists knew the Thule used the ribs, jaws, and skulls from baleen whales



A virtual recreation of Temple 22 at Copán, a Classic-period Maya kingdom in Honduras.



The ruins of the actual Temple 22 are seen here.

as a structural framework over an excavated pit. The bones were covered with hides, sod, and snow, and the whole structure weighed thousands of pounds, which meant good design was crucial to avoid a deadly collapse.

The first steps were to scan an articulated whale skeleton hanging in the New England Aquarium, create 3-D models of each bone, and put them together like virtual building blocks, based on the positions of fallen bones in excavations. This “reverse-engineering” process, as Dawson calls it, showed that some designs were more stable than others. At one site, three whale skulls had been used around the entrance, possibly for symbolic purposes. Another site used 15 whale jawbones as roof supports, in what seemed like a more utilitarian design. When he simulated both designs, he found that while both were structurally sound, the one that

used the skulls was less so, and would have required more maintenance to keep it habitable.

“This would imply that using whalebone in a symbolic capacity did reduce the structural integrity of some house designs, albeit not to a degree that would have placed families in jeopardy” says Dawson. More than anything, he says, the simulations show “the Thule people knew a great deal about the geometry and physics of building with whalebone, one of the most unusual and perhaps challenging types of building materials ever used in construction.”

When both reconstructions were finished, they were filled with digital replicas of artifacts scanned from museum collections, including knives, harpoons, toys, drills, and bags. Then the team flew in nine Inuit elders from remote villages to experience them firsthand. The interiors were projected onto the walls and floor of a high-definition projection system at the University of Calgary called a CAVE. The sounds of drumming, wind, and birdsong helped complete the atmosphere. When the elders sat inside the CAVE wearing 3-D glasses their strong emotional reactions took the researchers by surprise. “They were very, very moved,” Dawson says. “One said he felt like a shaman going back in time. Another said now he really appreciated the ingenuity of his ancestors.” In a sense, he says, it was the first time any Inuit had sat inside one of these dwellings in centuries.

Another of Dawson’s virtual projects is at Fort Conger on Ellesmere Island, which is part of Quttinirpaaq National Park in the Canadian Arctic. The wood buildings were built and modified by explorers in the late 19th century, including Robert Peary on an early attempt to reach the North Pole. The site faces a number of threats, including the impact of erosion and increasing numbers of visitors. Ironically, one

of the biggest hazards comes from its original builders, who brought chemicals like mercury and arsenic for preserving specimens and making weather observations. Over the past century, the containers they left behind have slowly leaked their toxic contents into the soil.

In 2010, Dawson, Chris Tucker of SarPoint Engineering Ltd.; and a team from Parks Canada made 3-D scans of the site using two types of lasers: mid resolution with a range of 15 feet or less, and long-range, with over 300 feet of coverage. Just getting the scanners to the site in one piece was a challenge involving days of transport on small planes, but Dawson says that was actually one of the points of the project. “We wanted to prove if you could do laser scanning in an area as remote as north Ellesmere Island, you can do it anywhere,” he says. On site, the team had to protect the delicate, expensive equipment from extreme cold and insidious dirt.

The data they brought back will serve as a baseline to measure future impacts and help plan conservation efforts, which could include remediating or removing the contaminated soils. Dawson and his team have also created an animated model of the site that he plans to launch as an interactive website. Like the indigenous dwellings, the Fort Conger recreation will have a strong educational component when it is made available to the public, primarily to teach Inuit schoolchildren about their cultural history.

That leads to another hurdle, however: although the Canadian government has a mandate to increase rural communities’ access to the Internet, many still don’t have high-speed connections, which limits access to high-bandwidth sites with lots of graphics and animations. “You have to keep in mind the technical limitations users face” when creating



A University of California, Merced student is dressed in a suit with sensors in order to create an avatar that can function in a virtual environment.

educational sites, Dawson says. Though bandwidth will only increase, “it’s very important to create what people can access equally.” On top of that, he says, these kinds of projects can be very expensive; some of the scanners he shipped to Ellesmere Island cost hundreds of thousands of dollars.

In real life, access to some Native American sites is strictly limited to certain sexes, or people who have endured rites of passage. Making that archaeological data accessible online raises ethical issues, says University of Massachusetts Amherst archaeologist Dan Lynch, who is a consultant with the Cultural Heritage and Archaeology Research Technologies laboratory at Eastern Oregon University. “Open access to virtual data has the potential to be very invasive into



Maurizio Forte works in a laboratory. Forte is an advocate of cyber archaeology, which features virtual models that can be continually changed and improved.

their cultural beliefs,” he says, “even though it isn’t being destroyed in process of studying it.” As part of the planning for a virtual field school he’ll teach next year with archaeologist Rory Becker, Lynch is consulting with indigenous groups and experts in intellectual property law about this issue.

Virtually No Virtual Archaeology in the U.S.

It’s ironic, says Donald Sanders, that even though most of the hardware and software used in virtual archaeology projects was developed by U.S. companies, most of the virtual work takes place in other countries. “We’re still not 100 percent sure why it’s the case. It’s a question we’ve wrestled with for decades.” In addition to the Institute for the Visualization of History, Sanders also runs Learning Sites, which was founded in 1993 and was the first firm to do virtual heritage work. It’s still one of the few in this hemisphere, if not the only one, he says. “Things really haven’t changed since we started.”

Sanders blames a combination of factors, starting with funding. In the European Union, where there’s a strong emphasis on tourism and marketing cultural heritage, these archaeology projects are “virtually guaranteed to get funding from the EU in one form or another,” he says. “In Japan, it’s the opposite: businesses are thrilled to lend their name and in-house R&D to subsidize projects. We have neither in this country.”

Maurizio Forte concurs. “If it weren’t for the Andrew W. Mellon Foundation and the National Endowment for the Humanities, the situation in the U.S. would be truly dismal,” he says, “but luckily they have been pioneers in recognizing the importance of this new field.”

But Sanders also notes that virtual archaeology has demonstrated “that it is a much more efficient, cost-effective, and insightful way of understanding the past than... some traditional methods. So I suspect there’s something more going on than funding.”

Another reason might be a relative lack of dramatic monumental architecture that lends itself to virtual experiences, compared to Europe or Asia. The closest analogue might be mound builder sites in the Midwest and Southeast, or some of the impressive prehistoric architecture of the Southwest.

At the university level, Sanders and Forte agree that tradition is also responsible. Virtual archaeology projects require a multidisciplinary skill set ranging from traditional archaeology to cutting-edge computer science. “There are still very few classes in the U.S. focused on digital and virtual archaeology,” Forte says. (In 2013, Becker and Lynch will teach the country’s first field school focused solely on non-invasive techniques at Eastern Oregon University.)

In the end, Sanders says, it may come down to how much we value our cultural heritage. Living surrounded by sites thousands of years old, as is the case in much of the Old World, does seem to make a difference, according to Sanders. “We don’t have the same sense of history that they do.” —Julian Smith

Some challenges apply to all virtual heritage projects, such as a lack of software standards, according to Donald Sanders of the Institute for the Visualization of History, an educational organization that uses virtual archaeology to recreate historical places and events. On the other hand, says Bernard Frischer of the University of Virginia, some de facto software standards are starting to emerge, judging by work presented at recent conferences. Another important standard to set is how to distinguish the parts of a virtual recreation that are based on conjecture from those based on hard data.

“Even seven- and eight-year-olds raise this question when their schools come to see our work,” says Frischer, who has supervised digital reconstructions of ancient Rome and Hadrian’s Villa. “It’s a natural human impulse first to believe your eyes, but then for the brain’s critical capacity to click in and raise questions.” The London Charter for the Computer-Based Visualization of Cultural Heritage is the best hope for developing a code of best practices, he says. “We always [should] provide linkage to the underlying scholarship, even when the 3-D creation is primarily intended for general audiences.”

Then there is the question of how to disseminate the data and results from the growing number of virtual projects. Peer-reviewed outlets are few, Sanders says, and besides, “there is something very odd about using paper to talk about interactive 3-D environments.” In 2013, Elsevier will launch *Digital Applications in Archaeology and Cultural Heritage*, an online journal that will be the first to publish peer-reviewed 3-D models of cultural heritage sites, according to Frischer. “The main challenge is to get scholars to see that 3-D technologies are primarily useful as tools of discovery, not simply as tools to illustrate discoveries we have already made,” says Frischer, who will edit the journal. “We need to apply tools to take measurements and observations that would be impossible short of real time travel.”

The future of virtual archaeology is as exciting and unpredictable as the future of technology itself. Forte is currently developing a teleimmersive archaeology system that would let researchers collaborate remotely in a virtual environment. Three-dimensional models of a site or object can “be shared virtually and simultaneously by different virtual labs in the world just when they are discovered and digitally documented,” he says.

Dawson predicts museums and heritage sites will take more advantage of augmented reality applications on smart phones and tablets. In the end, he hopes his digital models won’t divide the old and the young, as technology sometimes does. “My dream is seeing an elder with his grandson or daughter looking at one of our virtual worlds—the young person is navigating through the house, the elder is saying what the artifacts were and what they were used for,” he says. “It’s a way to bring two generations together.”

JULIAN SMITH is the author of *Crossing the Heart of Africa*. His article “*That Old Black Magic*” appeared in the Fall 2012 issue of *American Archaeology*.

A Road to the Past

AN ARCHAEOLOGICAL PROJECT RESULTING FROM
A HIGHWAY EXPANSION IS REVEALING SURPRISES
ABOUT COLONIAL LIFE IN DELAWARE.

BY ALISON MCCOOK

Archaeologists with Dovetail Cultural Resource Group excavate the main house cellar at the Houston site.

american archaeology

On a sunny fall day in 2011, as archaeologist William Liebknecht was screening excavated dirt from a soybean field in central Delaware, he found something that changed his picture of colonial life in the region. Liebknecht was part of a team of archaeologists with Hunter Research, a cultural resource management (CRM) firm that was excavating a site that will eventually be destroyed by the expansion of U.S. Route 301, the state's largest highway project in 15 years.

On that day in 2011 he found a type of English ceramic sherd that's rarely seen in Delaware. The white slip over the red body, along with a characteristic scratch decoration known as sgraffito, identified it as a well-known type of pottery made in north Devonshire in England, which stopped being exported to the American colonies in the 18th century. "That was one of those moments where I just said, 'wow'," Liebknecht says. "It was a surprise for us to see it in this area because it's never been found in Delaware before. It's not what we expected at all."

Based on their research of the archaeological record and previous historical studies, the archaeologists assumed that few European Americans were living in central Delaware

during the late 17th to the early 18th centuries, and that they had little if any access to fancy goods. "What we're finding out from this project is that may not have been the case," says David Clarke, an archaeologist for the Delaware Department of Transportation (DELDOT), which is overseeing the project. "There may have been all these people living here."

Central Delaware is overrun by trucks. In the suburban community of Middletown, heavy vehicles chug past construction sites for new schools, hospitals, and housing developments. To reroute those large trucks from residential areas, DELDOT is building a new 17-mile, four-lane highway at the cost of roughly \$800 million.

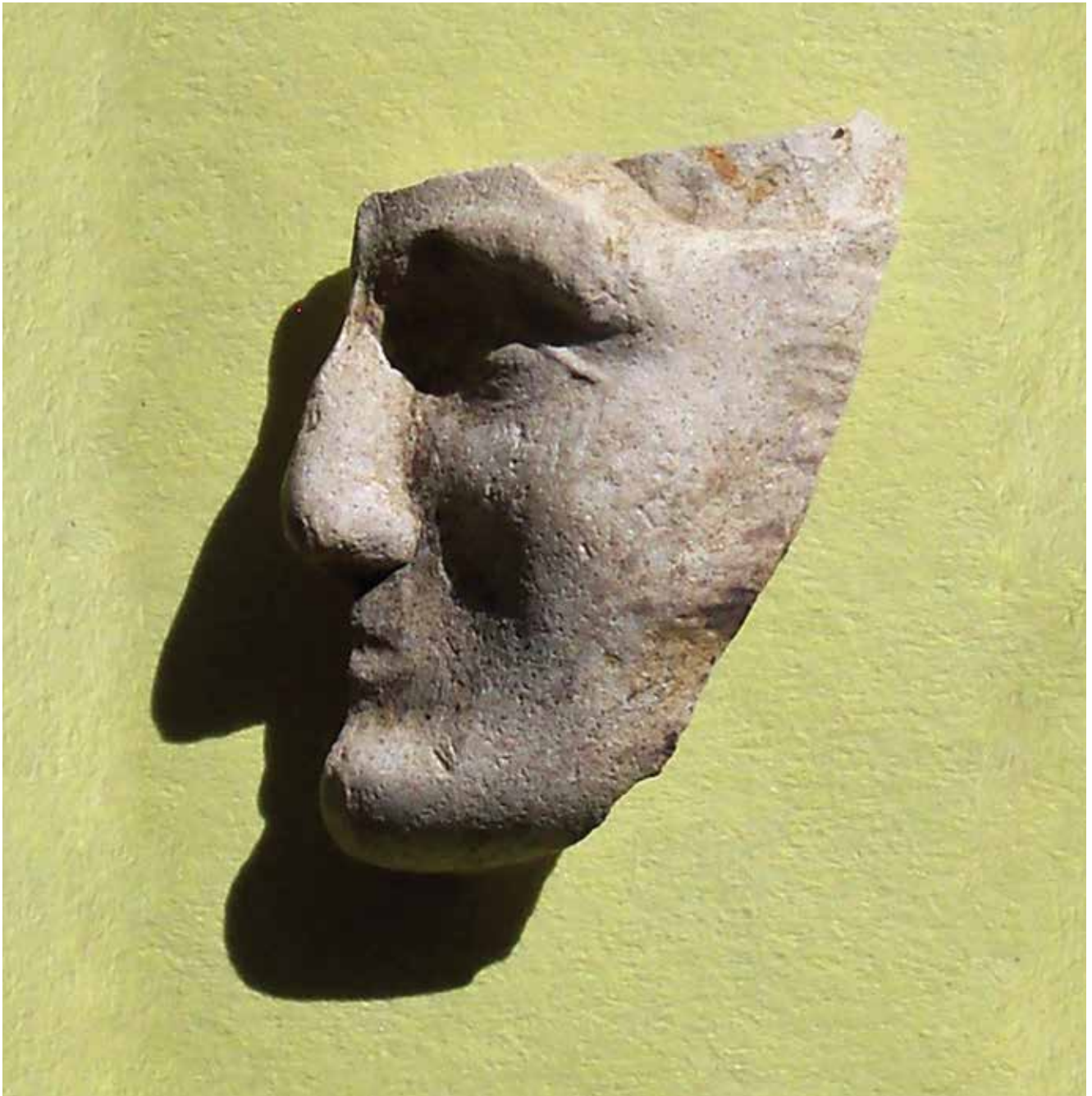
This in turn gave birth to the huge, \$12-million archaeological project managed by Clarke. Many projects of this sort hire one CRM firm to do all the work, but Clarke, having consulted with the State Historic Preservation Office (SHPO), decided instead to hire nine. In addition to speeding up the fieldwork, this decision, according to Clarke, lends the project a wider range of expertise and increases the economic impact of the state and federal money being spent.

In addition to its benefits, working with this many firms,



DOVETAIL CULTURAL RESOURCE GROUP

This serving platter with a slip design was discovered in the cellar of the Houston house.



The Houston site also yielded a 19th-century pipe-bowl fragment with a man's profile. The archaeologists haven't identified who it portrays, but they suspect it was a prominent politician.

who usually compete against, rather than cooperate with, each other, also has its challenges. He requires the CRM firms to share their data so everyone will have the big picture of the archaeological discoveries, which has led to such unintended consequences as firm A alleging that firm B's work is slipshod, and that A could do it much better. So Clarke spends a lot of time dealing with such matters and making sure that the competitors continue to cooperate.

During the first phase of the archaeological project, which included a cultural resource survey of over 500 acres of land, the researchers identified 68 possible sites.

Due to the limitations of time and money, all 68 sites could not be excavated, so the second phase of the project

american archaeology

focused on evaluating the significance of the sites to determine which were important enough to be excavated prior to the roadwork or, if possible, preserved in place. Federal law mandates that the SHPO take part in the evaluation process, so consequently Clarke, fellow DELDOT archaeologist Kevin Cunningham, and Gwen Davis, the SHPO's archaeologist, spent countless days assessing the quality of the artifacts and considering each site's research potential. Federal law also mandates that the parties concur in their determinations. In the event of a disagreement, a federal agency called the Advisory Council on Historic Preservation would attempt to resolve the dispute.

Though there was an inherent tension between their

respective offices—DELDOT “wants to build a road and the SHPO wants to not build a road,” says Clarke—the three of them recommended that 27 of the 68 sites were significant enough to investigate in detail. “To meet the schedules, we had to make compromises and move on,” he says. “We can’t hold up the construction of a \$800 million highway because we can’t make decisions.” Their recommendations then had to be approved by the Federal Highway Administration, which funded part of the project. The other 41 sites will undergo no further research and will be destroyed during construction. “There have been times when I’ve lost sleep,” confesses Clarke. “By giving a thumbs down on a site, we’ll never know what’s there. That’s a hard decision.”

Of the 27 significant sites, 14 were deemed potentially eligible to be on the National Register of Historic Places. Consequently those sites have to be preserved if possible, or, failing that, completely excavated before they, too, are destroyed. Eight of those sites were entirely or partly preserved by making minor changes to the design of the highway. The remainder are being excavated during the third phase of the project, which began earlier this year. No further excavations will take place at the other 13 sites that are ineligible for the National Register prior to their destruction.

There’s no information out there on how the everyday person lived except for (sites) like this,” says Kerri Barile, president of Dovetail Cultural Resource Group, who is directing one of the digs. That information indicates that rural Delaware’s residents were much more connected to international trade networks than previously believed. Finding that people in these remote areas participated in international trade “changes our entire way of thinking about all the sites in this area.”

Although this part of the state is a short distance from both the Chesapeake and Delaware bays, in the 1700s there was little or no local infrastructure, such as roads. Some of the Native Americans were hostile, and there were also

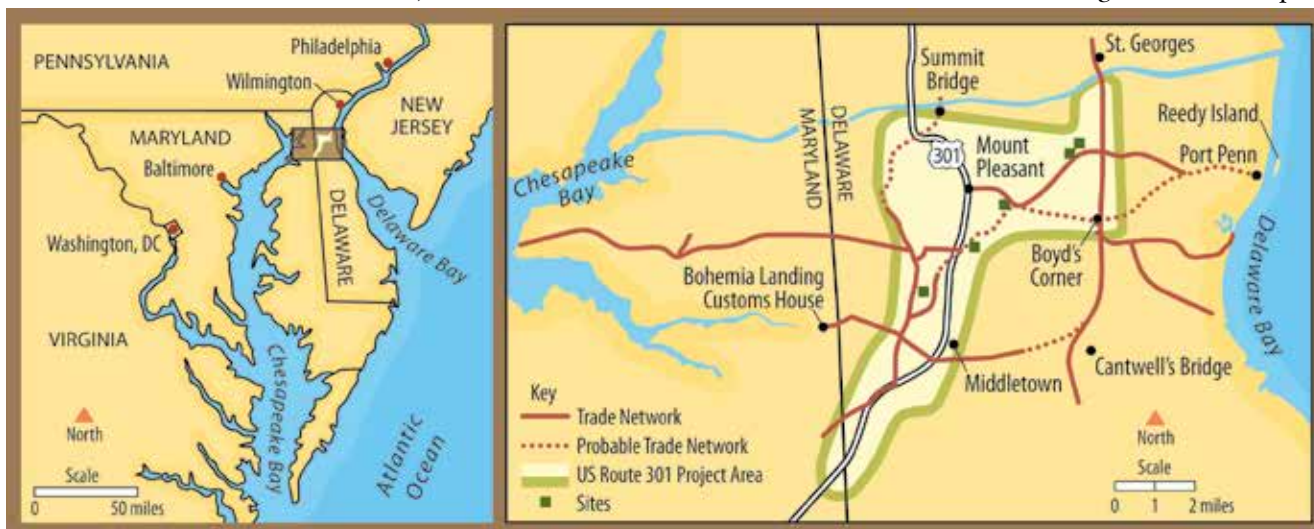


JOELLE BROWNING, HUNTER RESEARCH, INC.

Archaeologists exposed this section of a road that was part of the trade network through which goods were moved between the Chesapeake and Delaware bays.

conflicts between European Americans, such as the Dutch and the Swedes, who fought over land. This was “not a hospitable place,” says Clarke, so its residents tended to stay close to home.

In the early 1700s, the British taxed goods that moved between the Colonies, and it appears some of the Delaware trade was untaxed, and therefore illegal. The project has uncovered five sites that the archaeologists think were part



INFORMATION ILLUSTRATED

Archaeological and historical evidence indicate that there was a trade network that people in Delaware participated in. The right map shows that network as it’s thought to have been in historical times. The known segments of the trade network are represented by solid brown lines, the dotted lines represent likely segments. The highway project has led to the excavation of five sites related to the network.

of an illegal trade network. To reach one of those sites, Cardon-Holton, Clarke has to slowly maneuver his truck through mud-filled ruts of an unmarked road. A thick, curved tree line stands on the left, beyond which lie wetlands. Eventually, he reaches the area where Liebknecht and a number of other archaeologists from Hunter Research are excavating.

According to historical documents, Cardon-Holton was first settled in 1722 by William Cardon. After his death in 1737, a tenant occupied the land, which contained a well, smokehouse, main house, and other features. The road Clarke took to the site appears on a map that was made around 1740. It covered roughly eight miles and traversed the state between the Chesapeake and Delaware bays. “We didn’t expect to see such amazing archaeological finds along this road,” says Clarke. He anticipated discovering mostly locally made, plain ceramics; instead, the site is yielding goods such as gunflints and ceramics from overseas. “We’re seeing all top-shelf, high-end goods,” such as purple manganese stoneware with a glaze specific to a region in Germany from the turn of the 18th century, says Liebknecht.

Clarke theorizes that the residents of Cardon-Holton participated in illegal trade, which historical documents state took place around this time. “The British Royal Navy

was really watching” the southern portion of the Chesapeake Bay,” says Liebknecht. “It’s where the majority of tobacco” bound for Europe came from.

At the Elkins site, which was part of the illegal trade network, Liebknecht found a batch of redware pottery that he couldn’t quite place. “I’m digging up all this redware, and I’m thinking, ‘this looks familiar.’” He decided to share photos of it with a fellow archaeologist, who saw similarities between the Elkins’ redware and vessels produced from the 1720s to 1746 by the noted Philadelphia potters the Hillegas brothers. Coincidentally, archaeologists with Liebknecht’s company, Hunter Research, had found Hillegas redware during a dig behind Betsy Ross’ house in Philadelphia 20 years ago.

Liebknecht compared the redware from the Elkins and Hillegas sites. “Everything about it was a dead on, spot on match,” he says, which suggests the Elkins site residents obtained the redware from someone who traveled there from Philadelphia in exchange for local goods such as tobacco, wheat, or butter. To confirm this, the archaeologists will perform an X-ray fluorescence analysis to determine the chemical makeup of the redware from the two sites. This will show whether or not they’re a true match.

The other sites on the illegal trade network contain



WILLIAM B. LIEBKNECHT, HUNTER RESEARCH, INC.

A researcher holds a sherd from a German grey-bodied stoneware tankard dating to the first half of the 18th century.



LINDSAY LEE, HUNTER RESEARCH, INC

These red-bodied earthenware vessels—(from top, clockwise) a plate, tankard, another tankard, cream pitcher, and bowl—were recovered from a shallow root cellar at the Elkins site. The items date to the third quarter of the 18th century.

items that include a brass Chinese coin, and a copper alloy disk that served as a cuff link and carries a portrait of King George II and Queen Caroline. The archaeologists suspect it was a high-quality, commemorative piece from their 1727 coronation.

The archaeologists assume the illegal trade network began in the upper portion of the Chesapeake Bay, where people from Maryland and Virginia could transport tobacco and other goods across the mid section of Delaware to the Delaware Bay. There, a larger vessel could transport the goods undetected up the Delaware Bay to Philadelphia or up

the coast to New York. Archaeological evidence suggests that goods moved across Delaware in the other direction as well.

Based on historical accounts of illegal trade in Delaware and New Jersey, as well as the discovery of ox shoes and the center hubs of cart wheels on the road, the archaeologists suspect the people who occupied the Cardon-Holton site maintained the road and provided the oxen to pull carts, for which they received some of the goods.

It's known that the merchants used oxen to drag their boats on giant sleds down the road to the Delaware Bay, where they placed them back in the water.

There was a customs house at one end of the road, but there are numerous historical accounts of tax collectors throughout the Colonies being bullied or bribed. Indeed, Liebknicht and his colleagues have found 18th-century court records of a tax collector saying he was beaten up. “American merchants are doing everything they can to reduce their tax burden,” says Clarke. “A lot of this is setting the groundwork for why we had an American Revolution.”

People in rural Delaware who didn’t live along the illegal trade network also obtained trade goods. At another site along the path of the new highway, the brick-lined basement of an 18th-century log cabin contains jewelry, cuff links, and more buttons—including many that are hand-painted—than any other site Barile has excavated. The first occupants of this land, the Houston family, didn’t bring all of these precious objects with them when they settled the land, she notes, because some date to after they arrived in the 1770s—one pickle bowl, for instance, is made of pearlware, which wasn’t imported until 1775. This evidence suggests that the Houstons, and other 18th-century families in this region, were linked to an extensive trade network. “Both the quantity and quality of the items were surprising for rural areas,” she says.

Once Barile and her team began the excavation, they looked at historical documents such as title, tax, and court records, and found something else unusual: the first occupation by the Houstons was listed under the name of the wife, Mary. She passed the house down to her son, and then in



This button was recovered during the first phase of the archaeological project.

american archaeology



A hand-painted cuff link was found in the Houston house cellar. This mid-18th century jewelry would have been worn by a male, possibly one of Mary Houston’s three sons.

1865, county land deeds show a James LeCompt bought the property as a tenant farm, and lived across the street. (Thankfully, he tore down the Houstons’ house and built another property on top of it, sealing the artifacts in the original cellar.) The site was continuously occupied from the 18th to the 20th centuries. “I’d say almost 100,000 artifacts have come out of this site,” says Barile.

She suspects that Mary Houston used the earnings from her farm to buy material goods instead of more land. Since the Houstons were not located on the illegal trade network, they likely purchased their goods legally at a nearby port. The quantity of goods is more than Barile expected from Mary’s land tax and insurance records, which show she was apparently “upper middle class,” she says. “She obviously did travel a lot to get these goods.”

Besides being surprised by the extent of the trade, Clarke is amazed by the number of people estimated to live in rural Delaware during this period. Census data and academic estimates from the early 1700s indicate there were only a few people per square mile, but the archaeologists have found many more sites and artifacts than such a sparse population could produce.

All told, Clarke estimates that the excavators have unearthed “hundreds of thousands” of artifacts, most of which date from the 18th to the early 20th centuries, though some Native American artifacts are 8,000 years old. One site appears to be a 19th-century African-American farmstead. Having yielded their data, most of the sites, including those on the illegal trade network, will be buried under the new highway. When asked if she’ll be sad about that, Barile glances briefly at the Houston site. “Sad? No, I’m happy I got to explore,” she says. “Without the new road, we would never have learned what we’ve learned.”

ALISON MCCOOK is a writer and editor based in Philadelphia.

CHACO, Through a Different Lens

Controversy is nothing new to Southwest expert Steve Lekson. Now he's taken an unconventional approach to demystifying Chaco Canyon.

By Mike Toner





Pueblo Bonito is one of Chaco Canyon's remarkable great houses. Archaeologist Steve Lekson sees a similarity between Chaco's great houses and the elite residencies found in Mexico's altepeme.

Steve Lekson is at it again. Armed with bon mots and verbal darts, Lekson, an inveterate provocateur, is challenging traditional thinking about one of Southwest archaeology's most treasured icons, Chaco Canyon. This time, he wants to show that, despite a century of debate, the "mystery" of Chaco is, perhaps, not so mysterious after all.

It's no way to win a popularity contest in a scientific community where scores of scholars—Lekson among them—have devoted lifetimes to studying this complex of ancient ruins and roads that sprawl across northwestern New Mexico. But then iconoclasts are never popular.

A decade ago, in his book *Chaco Meridian*, Lekson, the curator of anthropology at the University of Colorado Museum of Natural History, stirred up a hornet's nest when he noted that three centers of the ancient Southwest—Chaco and Aztec Ruins in New Mexico, and Paquimé in northern Chihuahua, Mexico—were built on the same line of longitude. He suggested that the alignment was part of a grand design spanning five centuries and 500 miles of desert terrain. A fellow archaeologist called the idea "a crock."

That book is an example of the intellectual derring-do that's made him one of the leading figures in his field. "In many ways, Steve's ideas and publications have driven much of the intellectual agenda for Southwestern archaeology over the last 20 or more years," the noted Southwest archaeologist

William Lipe was quoted as saying in a 2009 *New York Times* article about Lekson.

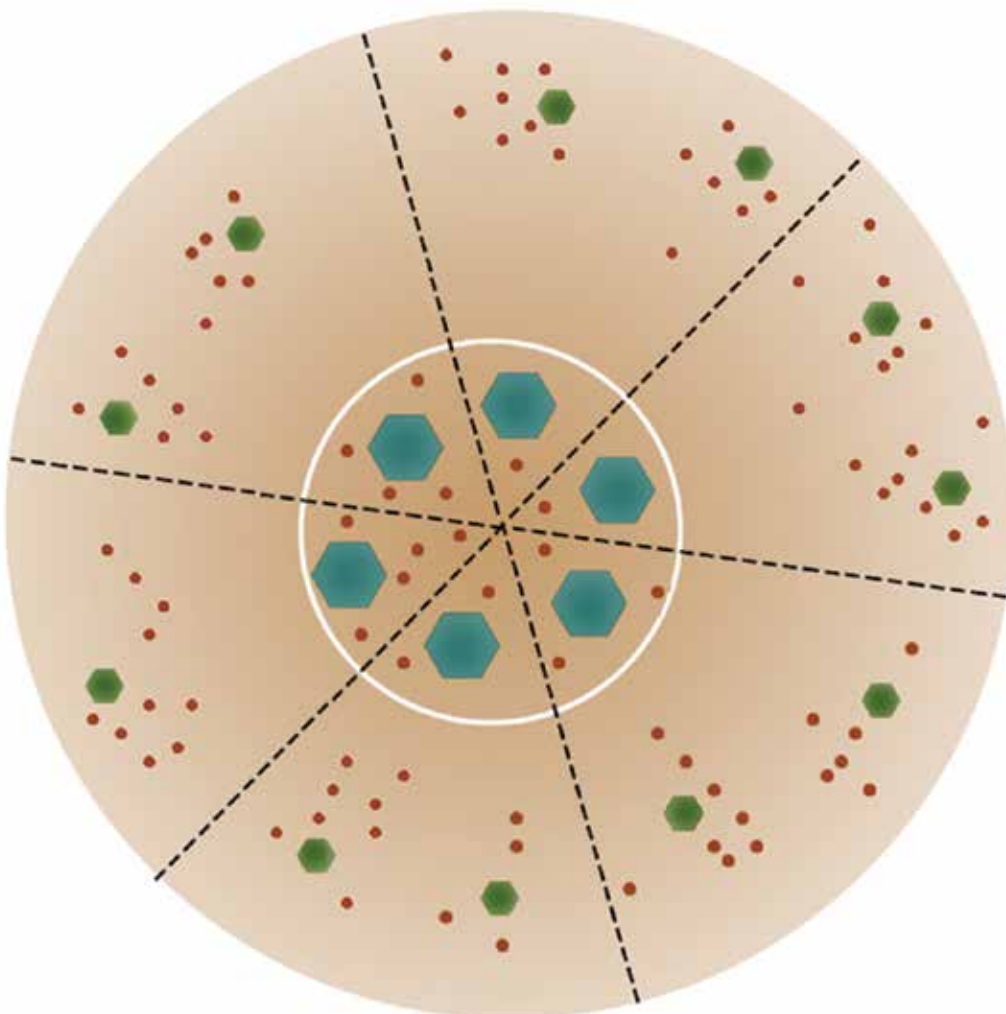
Four years ago in *A History of the Ancient Southwest*, Lekson chided his colleagues for overreliance on 20th-century ethnographic studies and "fuzzy stereotypes" of today's Pueblo peoples that were "pasting a Pueblo present on a Chacoan past." He said the result has clouded their understanding of Chaco.

Now, in a forthcoming book—Lekson is publishing a chapter at a time on the Internet, inviting readers to comment—he says that, despite what most experts believe, Chaco did not evolve in relative isolation. Instead, the Chaco phenomenon can only be understood in a context of cross-pollinating cultures that stretched from the pre-conquest city-states of Mesoamerica to Cahokia and the Mississippian chiefdoms of the Southeast.

"Over the last century, Southwestern archaeology has been painting itself into tighter and tighter corners," Lekson says. "Chaco and Cahokia were not petri dishes on a lab shelf. They were corners of a huge terrarium. Our failure to understand Chaco tells us that we have not thrown our nets out far enough. Chaco may actually be pretty easy to understand, and not that big of a deal if we just go beyond the Pueblo space, conceptually and geographically."

In particular, he believes that Chaco was a Southwestern

The altepetl was a small city-state of nobles and commoners, encompassing both an administrative-ceremonial center, represented here by the area within the white circle, and its agricultural countryside, shown outside the white circle. A half-dozen noble families built palaces, represented by large hexagons, in the center. Scores of minor palaces, represented by small hexagons, were scattered through the countryside. Commoners lived in thousands of small, simple farmsteads, represented by small dots. Chaco, Lekson argues, is similar in that it also had a center and countryside. Its great houses were like elite residences, its outliers like minor palaces. Chaco's commoners resided in small unit pueblos. Population estimates of altepeme and Chaco are also similar, according to Lekson.





Steve Lekson stands by a colonnade at Chetro Ketl, another Chaco great house. Colonnades are Mesoamerican architectural features.

adaptation of an indigenous Mexican city-state known as an *altepetl*, a word from the Nahuatl language spoken by people in central Mexico. There is disagreement among some scholars as to when *altepeme* (the plural of *altepetl*) first appeared in Mesoamerica, but according to Kenneth Hirth, a Mesoamerican archaeologist at Penn State University, they were established by A.D. 800, just as Chaco was beginning to emerge in the San Juan Basin. “The Southwest was the northern frontier of Mesoamerica,” Lekson says. “And Chaco was an *altepetl*—the form, if not all the content, of the basic Mesoamerican political unit, adopted on the frontier and transformed by local idiom and ideologies. Chaco was an *altepetl*, or at least *altepetl*-like. Mystery solved.”

The issue is not so much who built Chaco, but where they looked for their inspiration, and what kind of a society emerged there. Archaeologists generally agree that it was built by the Anasazi. Most also believe Chaco’s cultural roots can be traced to the Basketmaker III era, whose pithouses dotted the Four Corners region between A.D. 450 and 750. In the face of that narrative, Lekson’s ideas have spurred deep skepticism. It has also triggered a rush to the reference books to find out, as one scholar put it, “what the hell an *altepetl* is.”

Experts readily acknowledge the need to understand Chaco’s place in the wider world, but many balk at the notion that it was modeled after prehistoric Mexican polities a thousand miles or more away. Any similarities between Chaco and an *altepetl*, they insist, were purely coincidental.

“If Chaco was an *altepetl* because it was like an *altepetl*, then a rusted-out 1974 Honda Civic is a brand-new Bentley, because it’s like a brand-new Bentley,” says David Phillips, curator of archaeology at the University of New Mexico’s Maxwell Museum of Anthropology. “Both have four wheels, a motor, a windshield, and headlights. If Steve persists in this logic, I have a Bentley I want to sell him.”

american archaeology

Still, when Steve Lekson unleashes a new idea, he gets the attention of his colleagues. Like many of them, he was part of the Chaco Project, a National Park Service program that, over nearly a decade, excavated 118 sites and unearthed more than 100,000 artifacts from the complex. Lekson also organized the subsequent Chaco Synthesis effort, which attempted to knit the project’s discoveries into a meaningful picture of Chaco’s past.

“We still don’t have a synthesis that everyone can agree on,” says Phillips. “Trying to understand what kind of a system built Chaco is a little like trying to take a picture of a shadow after the person casting it isn’t there any more.”

“I’m not sure that consensus will ever be reached about Chaco’s place in the ancient Southwest,” says James Judge, the director of the Chaco Project. “But we must applaud Steve’s propensity for periodically shaking the profession out of its lethargy. Steve is an incredibly talented archaeologist, and even though some of his interpretations are controversial, they demand careful consideration.”

Outwardly, Chaco and the Mesoamerican *altepetl* seem to have little in common. Chaco, which flourished from roughly A.D. 850 to 1150, was a major center, with 15 large complexes and more than 100 outlying communities spread across some 40,000 square miles of canyons and mesas in northwest New Mexico. A network of roads linked outlying communities with Pueblo Bonito, which some experts consider to be Chaco’s downtown. Pueblo Bonito’s 650-room great house and circular kivas are among the best-preserved and most studied ancient sites in North America.

But despite more than a century of excavation and study, archaeologists still differ over what exactly Chaco was. Until the late 1970s, some, including Judge, thought it was a center for the storage and redistribution of food in an arid region subject to wild swings in the food supply. More recently,

archaeologists have embraced the idea that Chaco central was a thinly populated pilgrimage center where thousands came to feast at certain times of the year, and then went home. New studies are now challenging that idea, too.

Chaco was unique in the Southwest, whereas altepeme were a dime a dozen throughout central Mexico. Current knowledge of them comes from archaeological evidence as well as Aztec codices. Before the Spanish conquest, altepeme were local polities of the Tula, and—post-Chaco—the Aztec empires. Commoners paid tribute to nobles, and nobles paid tribute to higher-ranking nobles, or kings. Rival altepeme warred with each other, formed alliances, then dissolved and reformed them. After the conquest, their structure was incorporated in administrative units of Spanish rule—the colonial equivalent of city councils. Unlike Chaco, altepeme had pyramids, ball courts, and central markets, and they lacked structures like large, circular kivas.

Lekson acknowledges such differences, but he insists that there are also significant similarities between Chaco and the altepeme. He says both systems were, without a doubt, “a hierarchy of multiple noble families and associated commoners within a defined agricultural territory.” Chaco was larger geographically, but he believes that was because it took more space to support a population in the arid Southwest.

“Noble families were distinguished by their elite residences,” he says of altepeme. “Noble houses could be located in the countryside among commoner farmsteads, but palaces of the major noble families were clustered within a tight central zone.” To Lekson, that sounds a lot like Chaco. “Chaco was big. It was showy. It was expensive. It is one of the most obvious examples of stratified housing in all of archaeology,” he says. “The major great houses were markedly different from normal houses, the ubiquitous unit pueblo. If one

accepts that the great houses were palaces or noble houses, the similarity to the altepetl form becomes almost obvious.”

It’s not so obvious to others, however. “The altepetl is just not a good model for Chaco,” according to Michael Smith, an archaeologist at Arizona State University, whose specialty is the Aztec empire. Smith takes issue with several of the parallels Lekson draws between Chaco and atepeme. He says altepeme were defined not by their physical forms, but by the relations of people. “Altepeme were small, independent kingdoms,” he says. “The kings were aided by various councils of nobles, warriors, priests, and a small but growing bureaucracy of judges, tax collectors, and other officials. Chaco was not an altepetl.”

The notion of kings, chiefs, or other autocrats ruling Chaco, as the altepetl model implies, is sharply at odds with traditional ideas about the peaceable, egalitarian people who built Chaco and lived in harmony with the environment and each other. “Most people who support the pilgrimage model don’t want to believe that Chaco was a hierarchy in which someone had the power of life or death over others,” says Lynne Sebastian, director of historic preservation programs for the SRI Foundation and a former president of the Society for American Archaeology. While she agrees with Lekson that “Chaco is too complex for someone not to have been in charge,” Sebastian sees no reason to assume that hierarchy had its origins in altepeme.

Life-long Chaco scholars like Gwinn Vivian, curator emeritus of the Arizona State Museum, acknowledge that Chaco’s impressive multi-story great houses and other monumental architecture could only have been built by a society that had both leaders and followers. “Chaco obviously had a hierarchical structure,” says Vivian, whose father was also a Chaco scholar. “Something as complex as Chaco could not have been built without someone in charge.” But he says that “someone” was most likely a priestly class of elites, a view that fits more comfortably with egalitarian Pueblo-centric ideas of Chaco as a ceremonial site.

Judge also believes that the “ritual-pilgrimage” model is more likely than the altepetl-like rule of “power-hungry elites,” but he says Chaco’s social structure could have incorporated “a wide variety of sociopolitical structures, while retaining fundamental ritual underpinnings.”

Lekson’s view of Chaco as an altepetl-like city-state doesn’t completely exclude the possibility that it was a pilgrimage center. “There were priests at Chaco,” he says, “but there were also quite clearly kings or noble families. Thinking of Chaco as some sort of theocracy is simply extrapolating from modern Pueblo culture.” And if Chaco really was a pilgrimage center, it was apparently unique in the Southwest. That reason alone should compel researchers to look further afield for answers. And that, for him, means looking south. “Southwestern civilizations were maize based,” says Lekson. “Maize was a Mesoamerican crop. The western half of the Southwest spoke Uto-Aztecan, a Mesoamerican language. The Southwest was fundamentally Mesoamerican right from the beginning.”



Chaco has yielded artifacts, like this copper bell, that came from Mesoamerica.



This map shows Chaco and other cities, represented by dots, and their surrounding areas of influence. Lekson believes that Chaco's residents were in contact with people in Mesoamerican cities like Culiacan and Tula, as well as larger regions like Aztlán and Huasteca. He also thinks Chacoans were in contact with people in major cities in the Mississippian region, such as Cahokia and Spiro.

Many archaeologists believe that the major cultures of the Southwest—Anasazi, Hohokam, and Mimbres—evolved in relative isolation. Lekson's altepetl model challenges that long-held belief. Over the years, excavations at Chaco have unearthed a variety of trade goods that

attest to more recent Mesoamerican connections: jewelry made from Pacific seashells, copper bells, scarlet macaw feathers, and cloisonné ornaments which could only have come from south of the present day border with Mexico.

Within the last decade, archaeologists have also found residues of cacao, the raw ingredient of chocolate previously found nowhere north of central Mexico, in ceramics from Pueblo Bonito. "There was an active flow of people, ideas, innovations, and most of the things that shaped history," says Lekson. "Chacoans, or at least the nobles at Chaco, had to be aware of what was going on in Mesoamerica. Ideas flowed both ways. And one of those ideas was altepetl."

Other researchers say trade is not necessarily a proxy for political and cultural exchanges. Some, perhaps all, of Chaco's foreign trade goods could have been the result of so-called "down the line" exchange, in which goods were passed on from one trade center to another before reaching Chaco. "There is no question that there is Mesoamerican stuff at Chaco," says Thomas Windes, a Chaco expert with the University

of New Mexico. "But we don't know how much that trade influenced the culture there."

"Besides, you don't have to go all the way to Mesoamerica to explain Chaco," according to John Ware, director of the Amerind Foundation and Research Center in Dragoon,



Mississippian platform mounds like Cahokia's Monks Mound resemble Mesoamerican pyramids.

A number of Mesoamerican-style artifacts have also been discovered at Cahokia.

Arizona. "Almost everything that is truly distinctive about Chaco has local origins in the San Juan region. Chaco has a very strong ritual flavor and there is a strong ritual continuity with today's Pueblo. Many of the objects we have found at Chaco, such as bear claws, cloth wrapped cactus stalks, and wooden altar assemblages are still used in Pueblo rituals today."

And Ware dismisses the notion that something as complex as Chaco, with its monumental architecture, roads, water catchment systems, and precise alignment of buildings to solar and lunar cycles could only have been built by an authoritarian, atepetl-like society. That mistake is due in part to a misreading of contemporary Pueblo culture.

"Chaco was undoubtedly hierarchical, but so are the Pueblos today; outsiders just don't get to see it," says Ware. "The Pueblo will tell you that all consider themselves to be equals, but the Pueblos have been deeply ranked societies for over a millennium." One ethnologist, Joe Jorgensen, described the Eastern Pueblos as the "most top-down, centralized, political organizations of all the tribes in western North America north of Mexico."

Lekson maintains that hints of Chaco's Mesoamerican connections can also be seen in the ruins of Paquimé (also called Casas Grandes), "the last and greatest city in the ancient Southwest," in northern Chihuahua. Paquimé was a major mercantile center in the region between A.D. 1150 and 1450. Excavations there during the 1960s unearthed trade goods—copper, seashells, and macaws—similar to those found at Chaco. Lekson suggests that Paquimé could have initially been a center of contact with Mesoamerica, and later, after Chaco's collapse in 1150, been expanded by remnant nobles from Chaco itself. Paquimé occupies the southernmost point on his so-called Chaco meridian. Much of its architecture, including kiva-like structures, four-story great houses, colonnaded entrances, and T-shaped passages between rooms, echoes, and even surpasses, Chaco in complexity.

David Wilcox, former curator of anthropology at the Museum of Northern Arizona, says evidence of Chaco's Mesoamerican connections may someday be found elsewhere below the border. "To determine whether Lekson's proposals have merit, we need more knowledge. Western Mexico is still very understudied."

Unlike many challenges to the paradigms of prehistory, Lekson's ideas have not been fueled by major new archaeological discoveries. Fieldwork at Chaco has slowed since the Chaco Project was concluded three decades ago. "Native Americans are not very happy about the idea of new excavations and the government has pretty much honored their wishes," says Windes.

With a century of archaeology—field reports, sketches, photographs, tree ring data, artifact descriptions, and maps—fully digitized and available on line in the Chaco Research Archive (www.chacoarchive.org), many archaeologists say there is no urgent need for more field work. As a result, any new thinking about Chaco's place in the ancient Southwest

necessarily relies on the analysis of existing data.

The tension between prevailing theories and new interpretations is inevitable. Let's face it," says Ware. "As scientists, we're not always out there searching for truth. Sometimes we're just looking for ways to prop up our preconceptions. That's why we need rabble-rousers like Steve Lekson to keep us from getting too comfortable."

"We definitely need to consider other models for Chaco," agrees Sebastian. "The only problem with Steve's model is that he tends to pick data that fits his ideas and discard what doesn't."

Lekson bristles at being called a rabble-rouser. The Chaco as atepetl model, he says, "is a conclusion of 30 years of research based on data." And he is undeterred by his critics. "There is always resistance to novel interpretations. Not only do I connect the dots differently, I see different dots."

On a map of North America, in fact, the "big picture" formed by Lekson's dots range like measles across half the continent. He contends that both Chaco and Mesoamerica undoubtedly had contact with Mississippian chiefdoms of the Midwest, East, and Southeast. Hard evidence of such contact is exceedingly thin—a four-inch flaked obsidian blade from Mexico that was found at Spiro Mounds in Oklahoma in the 1930s. "Spiro was on the frontier of the Mississippian world," says David Anderson, a Mississippian archaeologist at the University of Tennessee, Knoxville. "There probably was contact, but we don't have a lot of evidence to support that."

Like the Mesoamerican atepeme, most major Mississippian cities had pyramids. At Cahokia, a huge Mississippian settlement that was the largest city north of Mesoamerica during the rise and fall of Chaco, excavations have uncovered decorative ear spools similar to those used in Mesoamerica, a Toltec-like dagger, renderings of long-nosed deities and other figures similar to those found in Mesoamerica, and pyramid groupings that resemble those in prehistoric Mexico. "There is no proof of contact," says University of Illinois archaeologist Timothy Pauketat, "but it's an idea that is germinating."

For Lekson, a germinating idea is as good a place as any to start. If, as many scholars concede, the Chacoan mystery may never be fully resolved, he feels that the gaps in understanding leave room for—perhaps even demand—new visions of Chaco's place in the ancient world. Many of his colleagues are looking for scientific certainty, and they're not going to find it. "We know so much about Chaco, yet we agree so little—effectively not at all—about what it was," he says. "The Southwest was fundamentally Mesoamerican right from the beginning. We should not be surprised if it was closely engaged with Mesoamerica throughout its history."

MIKE TONER is a Pulitzer-Prize-winning writer who lives in Atlanta, Georgia. His article "Fighting Archaeological Crime" appeared in the Fall 2012 issue of *American Archaeology*.

To read the chapter "Chaco as Atepetl: Secondary States" from Steve Lekson's new book, visit the web site <http://stevelekson.com/2011/07/22/what-was-chaco>

The Tales of Ancient Textiles

For years archaeologists ignored fabric artifacts. Now they're offering a relatively new and important line of evidence.

By Paula Neely

This piece of a 13th-century coiled basket came from Cliff Palace at Mesa Verde National Park in Colorado.

LATE ONE SUMMER about 2,000 years ago, a weaver who lived in the Ohio River Valley hiked into a field near her village and harvested an arm-load of milkweed plants to use for making cloth. To facilitate extracting fiber from the plants, she probably laid them in water or spread them on the ground where they could absorb moisture from the morning dew. When they began to rot, she cut them open and stripped out the fibers layered between the outer surface and the core of each stalk. After the long hair-like strands had dried, she spun them with rabbit hair into yarn, about the consistency of modern day kite string, by rolling strands of the fiber along her thigh with the palm of her hand, forming a twisted strand.



KATHRYN JAKES

A textile artisan demonstrates the twining technique that was used to make many of the textiles found at Siep Mound.

Then she cut a set of yarns, secured them parallel to each other with a perpendicular starting edge, and began twining them into cloth using a technique handed down from previous generations. When the cloth was the size she wanted, she colored it with red and yellow dyes that she obtained from plants and minerals such as ochre and bed-straw roots, in a pattern that resembled designs on pottery and other objects made by the Hopewell, an ancient culture that existed from about 50 B.C. to A.D. 500.

In the 1920s, archaeologists discovered a piece of the cloth in the Seip Mound, near Chillicothe, Ohio. The rare textile was stored in the collections of the Ohio Historical Society, where it was largely ignored for nearly a century until Kathryn Jakes, a professor of textile sciences at Ohio State University, and her graduate students rediscovered it about 10 years ago. They have been analyzing it along with about 200 other fragments of fabric artifacts from Adena, Hopewell, and Mississippian mound sites. Through scientific testing, analysis, and experimental archaeology, they've determined it was likely created by the above scenario.

During the past few decades, Jakes and other scholars studying fabric, baskets, sandals, cordage, nets, and other ancient textiles have been teasing out details about what plants they harvested to make yarn, how they wove textiles,

and how they used them. Catherine Fowler, professor emerita at the University of Nevada, Reno, said that, based on ethnographic studies, researchers assume that women did the bulk of textile production in North America. There are exceptions, however. Males have been involved in making and repairing nets, creating cradles, and making fish and bird traps, and Hopi men wove textiles.

Although the study of ancient textiles has increased since the 1970s, it remains limited because fiber objects are so perishable, and therefore rare. But there is reason to think that textiles were common in ancient times. According to Edward Jolie, director of the R. L. Andrews Center for Perishables Analysis at Mercyhurst Archaeological Institute, textiles comprise about 90 percent of the artifacts found at a handful of well-preserved hunter-gatherer sites.

Fiber artifacts are preserved at sites that are frozen year-round, extremely arid, or (conversely) wet and lacking oxygen. Those conditions retard the process of decay and disintegration by reducing or eliminating fungal and microbial growth. Strangely enough, charring and contact with corroding metals from copper or other metals, also promote preservation by killing destructive bacteria.

Most archaeologists ignored fiber artifacts until about 30 years ago, when more women entered the previously

male-dominated profession, said James Adovasio, director of the Mercyhurst Archaeological Institute. “The biggest issue is the enduring persistence of the myth of the primacy of durable artifacts ...and the concept of man the hunter,” he said. “We’re obsessed with guys with spears.”

When Adovasio was a graduate student at the University of Utah in the late 1960s, basketry was considered “women’s work,” and very few people wanted to study it. But after an excavation at Hogup Cave unearthed a trove of ancient baskets, his professor, Jesse Jennings, told him that he could “either develop a sudden interest in studying baskets or pursue his education elsewhere.” He chose the former option, finding it to be “a highly informative way to study the makers.”

Although some of his colleagues were “bemused” by his efforts, Adovasio published the first methodology for analyzing ancient textiles in the late 1970s. It is still used today, and he is generally considered to be the world’s leading authority on perishable artifacts. Since the late 1970s, the database of fiber artifacts has grown steadily because archaeologists are more aware of how to appropriately excavate, document, and stabilize them.

People were using textiles in Eurasia nearly 30,000 years ago, and Adovasio has no doubt that “the working of plant fiber was part and parcel of the armamentarium of the first migrants to the New World.” He led the investigation of Meadowcroft Rockshelter, a well-known pre-Clovis site in southwest Pennsylvania. Among the artifacts recovered from the site is a 16,500-year-old piece of cut bark that could have been part of a plaited basket. It is, he said, “the oldest directly dated, anthropogenically modified plant product” in the New World.

MOST OF THE FIBER fragments Jakes and her students analyze are small, ranging from palm-size to that of a postage stamp. The few pieces made with rabbit hair were dyed in shades of muddy red, green, yellow, and black with oval designs. More research is needed to understand how the colors were made and applied. “These were fine textiles that were colored and patterned. They were special. It took a long time to make them,” she said.

Jakes thinks that they could have been ritualistic or honorary objects that were part of burning ceremonies at the mounds. She and her students have replicated some of the textiles by experimenting with ways to harvest plants, extract fibers, spin yarn, and twine fabric. “Early people had great technological knowledge. They knew when to collect the plants, how to process the fiber, and how to make the yarn and dyes,” she said. “By replicating the fabric, you know what was in their minds.”

The researchers use optical and electron microscopy and elemental analysis to discern nuances of the yarn and the structure of the textiles. The size of the yarn and how it was twined suggests whether the fabric was worn as clothing, used for carrying things, or created for adornment. For example, cloth for garments would have been made with

american archaeology

loose twining so that it was flexible, whereas cloth for a bag would have been made with tighter, denser twining so that it would be sturdier. Analyzing the interlacing helps to determine if textiles were made on a loom or if they were woven by hand.

They have discovered that there is a consistency in the structure and design of fabrics from Hopewell mound sites throughout the Ohio River Valley. Milkweed, Indian hemp, nettles, and mulberry were used for fiber, and all of the fabrics were twined. That required the various groups to share ideas and technology, Jakes said. “Just as your clothing communicates who you are, these textiles transmitted a meaning about who they were.”

Artifacts recovered from the Etowah site in Georgia include a fragment, possibly from a headdress, that incorporated feathers that were dyed red. Etowah was built by the Mississippians and occupied from approximately A.D. 1000 to 1550. Etowah also yielded refined, lace-like textiles, found in elite burials boasting extravagant grave goods. Penelope Drooker, anthropology curator emerita at the New York State Museum, carried out a comparative analysis of complex lace-like fabrics from Etowah and other Mississippian sites. Because of their intricacy and the great amount of time invested in their production, she concluded that they likely were worn by elite members of Mississippian society, and



A cotton cloth with feather decoration was found at Palatki Heritage Site in central Arizona. It dates to between A.D. 1150 and 1300.



This Fort Rock-style sandal is 9,300 years old. It has a flat sole made of five warps and was secured around the ankle.

This example of a multiple warp sandal is 2,330 years old. The sole features a dozen or more warps that wrap around the sides and were secured by a tie over the top of the foot.

The sole of the spiral weft sandal was twined in a spiral pattern and was secured over the top of the foot with a tie through loops along the sole edge. This example is approximately 1,500 years old.

probably also functioned as ritual exchange items among leaders of different communities.

This fabric combined open and tight types of twining and required a high degree of expertise to produce, which may provide evidence of craft specialization. Based on attempts to replicate the fabric, it would have taken about 2,600 hours to make a five-foot square section of it.



Tom Connolly (center) addresses a group in Fort Rock Cave.

SOME OF THE oldest textiles in North America come from sites in the Great Basin, which encompasses areas of Nevada, Utah, Oregon, and California. The end of the Ice Age resulted in many large lakes that carved out caves and rock shelters along the region's mountainous shorelines. Prehistoric people set up temporary camps here during hunting and gathering expeditions, and they stored basketry, nets, traps, and weapons in the caves and shelters during the "off-season." Some caves were also used as burial and ceremonial sites.

During the past couple of decades, Tom Connolly, director of archaeological research at the Museum of Natural and Cultural History at the University of Oregon, and a team of researchers have used accelerator mass spectrometry to date fiber artifacts that were recovered from various Great Basin sites. "This stuff has been in (museum) collections for decades, but we didn't know how the pieces related to each other," he said.

The artifacts provide hints about the environment and what materials were available as the climate began to warm. He has analyzed cordage with three-strand braiding made of sagebrush bark that is 12,500-years old. There's also netting made of fine string-like hemp cord that dates to 12,000 years ago. "Netting was a really important tool for a lot of things," he said. "It could be used as a bag, or for rabbit traps, or for fishing, or snaring water fowl."

They also analyzed and dated over 70 different sandals made in different styles that were excavated from sites throughout the Northern Great Basin. The dates revealed the world's oldest directly-dated shoes, a trove of woven sandals found at Fort Rock Cave in southern Oregon, which was once a preserve of The Archaeological Conservancy and is now a state park. Fort Rock-style sandals have been found at other sites in southeast Oregon and northern and western Nevada and all dated examples are 9,200 to 10,500 years old. Connolly thinks prehistoric people would have worn sandals in the winter to help keep their feet warm as they walked through marshes and lakes to harvest reeds and waterfowl.

The chronology also revealed that around 9,000 years ago, the Fort Rock style was replaced by other sandal styles called multiple warp and spiral weft. Connolly said the change in sandal technology could indicate that the earlier culture was replaced by a different one. "There is good reason to suspect that there were different people involved," he said.

Both multiple warp and spiral weft sandals continued to be made for up to 9,000 years throughout the Northern Great Basin and Northwest Nevada. "It's astounding that there was such a strong continuity of style...It's a really compelling example of the strength of culture," he said. "Nowhere else in the world has such a strong signature of continuity."

A reassessment in the 1990s of intact fiber objects from Spirit Cave in Nevada revealed that highly sophisticated mats and bags were woven more than 9,000 years ago, which was roughly 6,000 years earlier than any similar textile that had been discovered in North America at the time. "It was shockingly early. They looked so fine and were so well made that people originally thought they were only about 2,000 to 3,000 years old. It pushed back our understanding about the chronology and sophistication of weavers," Fowler said, adding that it made sense that they were so skilled. "By then, people in Europe had been working with fiber for 20,000 years."

One of the bags that contained the cremated remains of a female had a leather shoulder strap and the face of the bag was decorated with waterfowl feathers twined into the fabric along with a strip of leather overlay. The earliest burial in the cave was a 46-year-old male known as Spirit Cave Man. He wore a head covering and his body was wrapped in a rabbit skin blanket and covered with two mats, one finely-woven, the other twined. The finely-woven mat, which was about three-feet square, was made 10,500 years ago. It had a diamond pattern and an undulating surface and was "impeccably woven," Fowler said. "People cared about these objects. They spent time on making them and mastered their techniques."

THE SPIRIT CAVE and ancient sandals studies were part of the development of a database of textiles that now includes over 360 directly-dated artifacts from the Great Basin. The database is providing information about where objects were discovered and the different techniques and materials used to make them.

When researchers discern that different people were using the same techniques, it suggests that they were sharing their technology, Fowler said. This information also adds to other archaeological evidence that tracks the movement of populations and trade. For example, coiled baskets first appear in the archaeological record in southern Utah nearly 9,000 years ago, then in western Nevada about 5,000 years ago, and then in southeastern Oregon 2,500 years ago, indicating the technology likely spread from Utah by migrating people, trade, or both.



This basket with interlocking stitches was discovered by a family that was hiking in Utah. It's roughly 150-200 years old.

Jolie's study of coiled baskets yielded insights into a seemingly abrupt, and puzzling change that took place in the Great Basin approximately A.D. 1000. Archaeologists have noted that around that time the region's material culture changed, becoming more like that of its modern populations. That, along with ethnographic and linguistic evidence, indicated that the people who had been living there could have moved and been replaced, or forced out, by a new population.

Analyzing baskets from more than a half-dozen sites in western Nevada, Jolie saw that they resembled the basketry of the Maidu and Miwok people in nearby northern California. Bearing in mind that the Great Basin was suffering from drought at this time, Jolie concluded that the people living in western Nevada left that parched area for northern California.

Oral histories of the Northern Paiute and other tribes that live in the Great Basin now speak of conflict, which suggested they removed the previous residents. But Jolie also identified "hybridized baskets" that combined the styles of western Nevada's old and new occupants, suggesting an exchange of ideas. This led him to believe that the transition between these two people was gradual—some of the baskets he analyzed date to A.D. 700—and probably peaceful. "It was a lot more complex than we have appreciated previously," he said.

Basketry chronologies have also shed light on how people adapted to climate change. A profusion of charred coiled baskets that date to about 8,500 years ago were discovered



J. M. ADOVASIO, COURTESY OF VAUGHN M. BRYANT

An antler tine was used to make this nearly 9,000-year-old tattooing or scarring needle. It has a coiled basket handle.

at Great Basin sites. They had been used as parching trays during the time when the wetlands had begun to dry up and seeds had become a dietary staple as other food sources became scarce or extinct. People put hot coals in a basket with nuts and seeds and gently tossed them to help separate the seeds from the husks and make them easier to digest. Based on his study of the basket assemblages from Great Basin sites, in 1970 Adovasio theorized that coiled baskets were invented to use as parching trays.

Based on an analysis of more recent data, including the discovery of the oldest coiled basket in the Americas, which dates to about 9,000 years ago, Jolie reached a different conclusion. The intact basket, which showed no sign of being charred by hot coals, is the size of a small bowl, whereas parching tray baskets were flat or slightly concave. Consequently, Jolie thinks that coiled baskets were originally made for a different, although unknown, function, and then later modified to serve as parching trays.

But there is no difference of opinion when it comes to Adovasio's statement that "We haven't begun to plumb the depths of what we can learn from textiles."

PAULA NEELY's work has appeared in *nationalgeographic.com* and *DIG* magazine. Her article "Uncovering the Chesapeake's Deep Past" appeared in the Spring 2012 issue of *American Archaeology*.

AMANDA THOMPSON, COURTESY OF THE OHIO HISTORICAL SOCIETY



This charred fabric from Seip Mound dates to the Hopewell Period.

UNDERSTANDING PREHISTORIC VIOLENCE



UNLV

University of Nevada Las Vegas bioarchaeologist Debra Martin analyzes 4,000-year-old bones for cut marks and perimortem fractures.

The archaeological record shows that violence has existed for millennia, but its causes are often a mystery. In an attempt to solve these mysteries, bioarchaeologists have gone beyond studying the vestiges of ancient violence, such as broken bones, to examining the conditions that caused it.

By Dan Ferber

Cold cases are notoriously hard for investigators to solve, and the killing at Arroyo Hondo Pueblo was no exception. Sometime in the A.D. 1350s, a respected Pueblo villager from the settlement, about 15 miles east of present-day Santa Fe, New Mexico, approached a four-year-old child. He lifted up a heavy grinding stone and then he sent it crashing down on the child's head, shattering the skull and killing the child instantly.

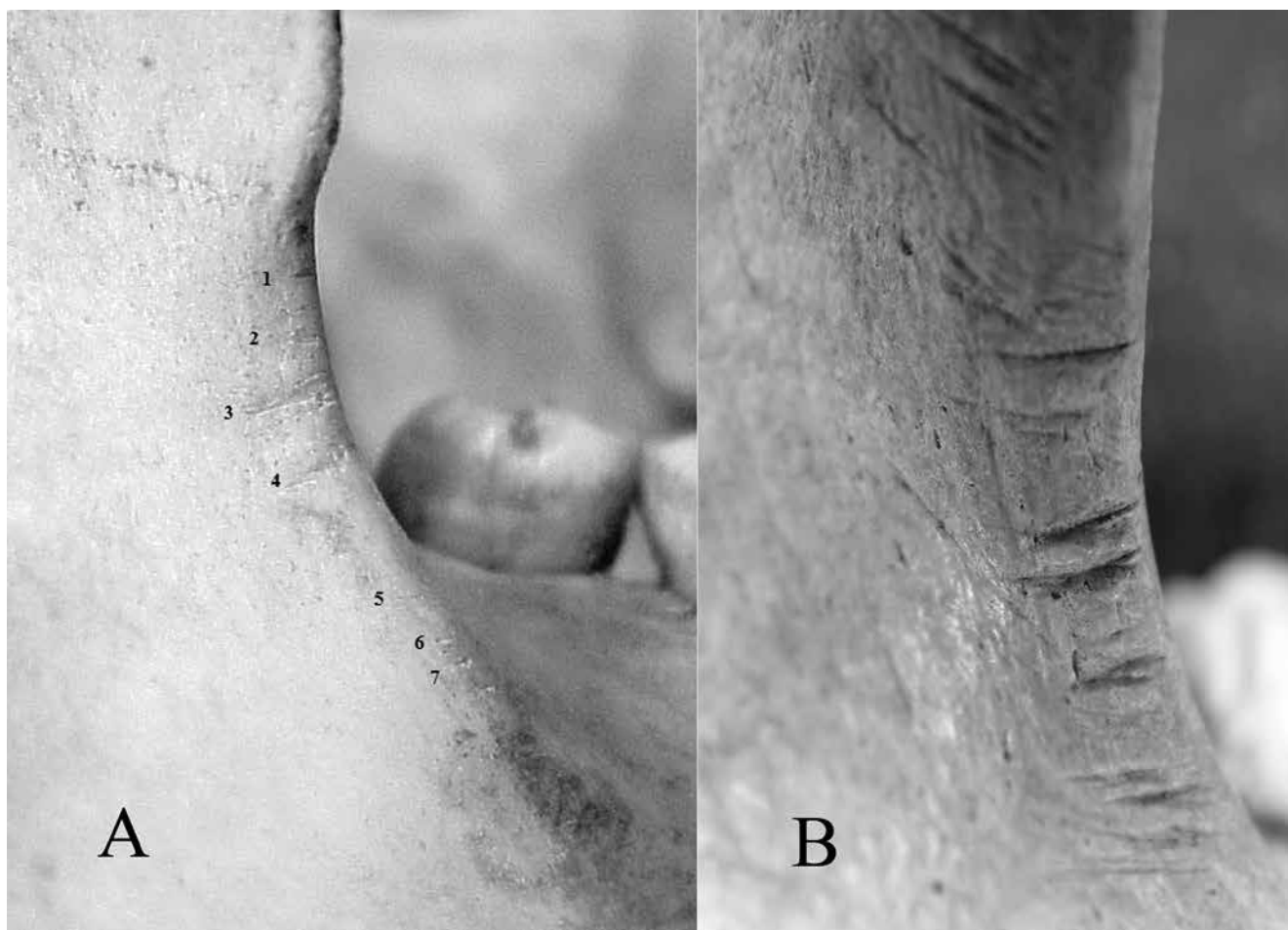
Someone, perhaps the same man, also knocked out five of the child's teeth and clubbed him in the ribs on both sides of the torso, breaking them. Two other children, ages three and four, were killed the same way at the same time, according to evidence pieced together by archaeologist Ann Palkovich of George Mason University. All three children's bodies were then tossed in the pueblo's trash.

In today's world, such a killing would be regarded as a heinous crime, and police and prosecutors would move heaven and earth to track down and convict the killer. Palkovich worked for years to solve this cold case. She conducted a detailed study of the children's bones and artifacts from the site, and she drew from advances in forensic science and from ethnographic studies of more recent Pueblo people. That evidence pointed to a conclusion that's shocking from a modern point of view, yet nonetheless true. "These kids were purposely killed to protect the village," she says.

Archaeologists once hewed to the view that small-scale, tribal cultures lived a peaceful existence in an Eden-like world, says George Milner, an archaeologist at Pennsylvania State University. But in a widely noted 2011 book, *The Better Angels of Our Nature*, Steven Pinker, the prominent Harvard University psychologist, argued that people today are killing, raping, torturing, and battering each other far less than in the past. That's largely because civilization maintains a rule of law that reins in dark forces like revenge, sadism, and tribalism that can drive people to violence, Pinker maintains. It's a view in line with that of Thomas Hobbes, the 17th-century English philosopher, who argued that without modern civilization, life is "solitary, poor, nasty, brutish, and short."

But over the past decade or two, archaeologists and anthropologists who study violence are uncovering a more complex—and more interesting—reality. "All of prehistory wasn't peaceful or torn apart by war. It was, in fact, a bit of both," Milner says.

That conclusion is based on the work of bioarchaeologists, who draw on archaeology, linguistics, biological anthropology, forensics, history, and cultural studies to examine violence past. As these researchers seek the roots of past battles, assaults, kidnappings, and killings, "we've gone from a descriptive science to a science that plugs into big fundamental questions about why humans do what they do," says



(A) Postmortem cut marks can be seen on a jawbone of an adult male from Peñasco Blanco.

(B) An adult male jawbone from La Quemada in northern Mexico reveals perimortem cut marks.

VENTURA PÉREZ



Students analyze plastic replicas of ancient bones in this advanced human osteology course taught by Debra Martin. They learn to assign age and sex, and to identify unusual features such as cut marks and other trauma.

Debra Martin, a bioarchaeologist at the University of Nevada, Las Vegas and co-editor of the recently published book *The Bioarchaeology of Violence*.

In order to study ancient violence, researchers have to correctly identify it. That was the goal of Ventura Pérez, a bioarchaeologist at the University of Massachusetts-Amherst and another of the book's co-editors, in a recent study on human bones found at Chaco Canyon, in northwest New Mexico. Other researchers had noted cut marks in human bones from Peñasco Blanco, a great house in Chaco. This led them to conclude that the Anasazi had killed and cannibalized humans. But Pérez knew that to people in some cultures the remains of family or high-ranking members of the community offer comfort or power to the living, so they let the bodies of these people partially decay, then cut them up.

To find out why Chaco's residents were cutting up dead bodies, Pérez studied both human and deer bones obtained from Peñasco Blanco. When Pérez started, all he could say was that the bones, which were excavated in 1898 and are now stored at the American Museum of Natural History in New York, had been cut around the time their owners died. Pérez compared cut marks on human bones with those on the bones of deer the Anasazi consumed.

Pérez made a plaster cast of each bone, used it at as a negative to make an epoxy cast replica, then took thin

slices from the replica and looked at it under a microscope to observe the cut marks in detail. Compared with the cut marks on human bones, those on deer bones were "twice as deep and wide even though they were similar bones that were cut in similar joint areas," Pérez says. That told him that rather than being cut up and eaten, the human bodies had been allowed to decay, then selected remains were processed by cutting off soft tissue. This finding revealed that a mortuary ritual—a ritual treatment of a dead human body, perhaps for religious purposes—had taken place rather than cannibalism.

The three children of Arroyo Hondo Pueblo (now a preserve of The Archaeological Conservancy) were killed for an entirely different reason, Palkovich has found. Her interest in their killings began as an undergraduate in the late 1970s, when she assisted during the original excavation of the site under the direction of Douglas Schwartz of the School of Advanced Research in Santa Fe, New Mexico.

A later analysis of growth patterns in the children's teeth revealed that when they died they were three, four, and four and a half, respectively. In addition, the children's bodies "were dumped together and covered with dirt," without the objects that connote a proper burial, Palkovich says. "That was the first clue that there was something unusual

about these kids.” She created a chart listing which bones were present, and she analyzed them to determine how tall the children were and if there was evidence of disease. Then she noticed that all three children had cracks that radiated from the midline on top of the skull downward to its base.

In the late 1990s, Palkovich analyzed the bones one last time before their remains were reinterred under the guidance of Pueblo elders and in order to comply with the Native American Graves Protection and Repatriation Act. By then forensic scientists had learned that cracks in the base of a skull are the result of blunt-force trauma to the top of the head, and that this type of injury invariably kills the victim quickly. “So I can say with little doubt that someone hit those kids hard on top the head, that they had blunt-force trauma, and that they died as a result of those injuries,” Palkovich says. The original excavators also found a *mano*, a type of grinding stone, in a midden near the children’s bones. That may have been the murder weapon.

“The question was, why were these kids beaten to death?” says Palkovich. To find out, she turned to ethnographic accounts of Pueblo Indians gathered between 1880 and 1940. Cultures have different ideas of what constitutes a full-fledged person, she says. In our society, we take for granted that a human being is a person who resides in his body from the day he’s born to the day he dies.

But in traditional Pueblo culture, personhood is conferred by a series of rituals, ethnographers had learned.

“When you’re born, you’re a human being, but not yet a person because your spiritual existence is still in the underworld,” Palkovich says. A Pueblo child gained full-fledged personhood by undergoing a naming ceremony at four days of age, a water-giving ceremony at one year, a water-pouring ceremony between six and 10, and a finishing ceremony at 10.

The three children of Arroyo Hondo died at a time when drought and disease were killing both adults and children. According to ethnographic accounts, the Anasazi, who are generally thought to be the ancestors of the Pueblo Indians, blamed community-wide misfortune on witches—unwanted and dangerous spirits that possess human beings and bring trouble to the community. And the Anasazi viewed young children as innocents who were particularly vulnerable to possession by witches. So in times of misfortune, “they go looking for witches, and children are not exempt,” Palkovich says.

Assuming the residents of Arroyo Hondo had beliefs similar to their ancestors, the evidence suggested a ritualized killing. The killer, Palkovich says, was someone with high standing in the community, like a judge or prosecutor in ours—“somebody who was sanctioned to face down a witch, which is a very serious matter.” The Anasazi faced down a witch by driving it from the human it had possessed, and the way to do that was by damaging his or her body beyond repair.



Kristin Kuckelman taking tree-ring samples at Goodman Point Pueblo. Tree-ring dates from samples such as these confirm that defensive villages such as Sand Canyon, Castle Rock, and Goodman Point pueblos were constructed in the A.D. 1250s and were attacked and abandoned about 1280.

CROW CANYON ARCHAEOLOGICAL CENTER



Ventura Pérez measures cut marks on human remains from Peñasco Blanco at Chaco Canyon.

“People in the past faced a range of problems we face in society today, and wanted to act for the greater good of the community,” says Palkovich. “They were much like us. These decisions were probably not easy for them.”

In the late 1200s, the Anasazi in the Mesa Verde region were facing desperation. Between 10,000 and 30,000 people had lived in the area for decades, but by 1280 they abandoned their homeland. Researchers learned, by analyzing the growth rings of trees that were extant then, that a severe drought had gripped the area from 1276 to 1299. They’d assumed that the drought had driven people from the region.

Before the drought, the Anasazi grew corn, beans, and squash and raised turkeys for food. But by the late 1270s they were eating mostly wild plants and animals, including rabbits, coyotes, and bobcats, according to an ongoing study by Kristin Kuckelman, an archaeologist at Crow Canyon Archaeological Center near Cortez, Colorado. What’s more, the area’s pueblos had been built in easily defended spots, which suggested conflict.

At the Castle Rock, Sand Canyon, and Goodman Point pueblos, Kuckelman and her colleagues found evidence of nonlethal fighting during the last years the pueblos were occupied, including bones with healed or infected fractures. She also found evidence of lethal trauma, including skulls with unhealed depression fractures.

All told, Kuckelman and her colleagues found the remains of at least 35 people who died at Sand Canyon, 41 at Castle Rock, and 11 at Goodman Point. Many remains were in sprawled positions from being tossed through a roof hatchway or left on top of a roof. Because these were not respectful ways to treat the dead, it suggested that these deaths were the result of attacks from other villages or communities. What’s more, the archaeologists found skulls with

cut marks above eye orbits or on the back of the head, which suggested scalping.

Together, the evidence coalesced into a narrative: after decades of plenty that allowed the population to grow, severe drought had gripped this high mountainous area, destroying crops and turkey flocks, and forcing families to subsist on wild animals and plants. Villages competed for those wild plants and animals with other communities and probably raided each other’s storehouses.

None of this explained the scalping. But ethnographic interviews of Pueblo people during historic times offered some clues. “At least two different ethnographers reported a belief among Pueblo Indians that scalps were powerful ways to bring rain,” Kuckelman says. “So if there’s drought, and a cultural belief that taking scalps could end drought and bring rain, then that’s a sanction for engaging in warfare.”

To understand the types of violence that cultures permit, it’s important not to impose preconceived notions, says Kathy Koziol, an adjunct professor of archaeology at the University of Arkansas. That’s what led earlier archaeologists astray when analyzing a group of 118 young women between 15 and 25 who had been killed and buried in four mass graves at Cahokia Mounds, a Mississippian site by St. Louis that was occupied between approximately A.D. 600 and 1400.

The Mississippian people buried their dead on top of existing graves, thereby creating mounds. Koziol focused on Mound 72, which contains “an interesting little mishmash of burials,” she says. When archaeologists Jerome Rose and Melvin Fowler first excavated Mound 72 in the early 1970s, their focus was understanding Cahokia’s socio-political structure, and one aspect of that was identifying the status of the individuals who were interred in the mound.

Rose and Fowler discovered two individuals who were buried with a cape made of shell beads arranged in the shape of a falcon, which suggested they had high status and were probably chiefs or shamans. Nearby were four mass graves containing the women’s remains. Because they were killed together and buried, without any material goods, near the elite burials, the archaeologists had assumed they were lowly members of society who were sacrificed to the elite men. Case closed—or so they thought.

Koziol thought otherwise. “I found those interpretations very unsatisfying,” she says. To find out who these young women were, Koziol read all the published material on Mound 72, and then began examining Rose’s photos, data, and field notes from the original excavation. “I was excavating file cabinets,” she jokes.

Rose and Fowler’s original interpretation of the Mound 72 burials applied an economic model based on the notion that the grave goods were a reflection of an individual’s status, and in doing so they glossed over the spatial and temporal distinctions in mound construction phases. Therefore important details, such as the determination that one of the



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The remains of final meals eaten by residents of Goodman Point Pueblo before the village was attacked and abandoned include the bones of a bobcat on a kiva floor.

four graves containing the women was in fact about 50 years younger than that of the elite men, was largely forgotten in future interpretations. “For 30 years people were married to this economic model,” Koziol says. “I was taking a whole new theoretical approach in interpreting those burials.”

Koziol noted the younger grave, and she also noted that the three other graves were buried in a section of the mound that, while unrelated to the area of the elite burial, was connected to a charnel house that could have held the remains of Cahokia’s elite. The charnel house was dismantled at the time of the women’s burials, which leads Koziol to conclude that the women were not sacrificed to the men, but were perhaps part of a charnel house closing ritual.

The women in all four graves also had different dentition and diets from the other individuals buried in Mound 72, and their skulls and long bones showed little evidence of chronic infections, including nonvenereal syphilis, that was evident in the remains of Cahokians. That indicated they were from an outside group, and it’s likely they were captured because they were young and healthy. Since they all died and were buried together, they were almost surely killed, probably by strangulation or poisoning, which leave no marks on the skeleton, Koziol says.

To find out why this happened, Koziol noted that the young women of Mound 72 were buried in neat, layered rows separated by woven mats. Another group of men and women who were later buried in the mound were killed violently by bludgeoning, and a third group of four men were killed and buried without their heads or hands. All these people were apparently assigned roles in the Cahokians’ central

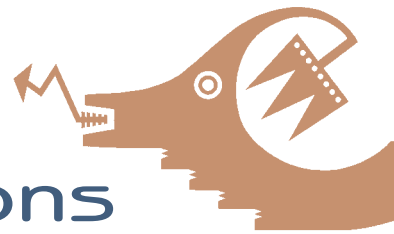
mythology of how the world came to be and people’s roles in it. “We don’t know all the details of that story,” Koziol says. “But we do know that the groups of people killed and buried here represent aspects of that story.”

That story belongs to the captors, but the victims’ stories are equally important. “Sometimes when we just see people as victims, we tend to dehumanize them and not hear their stories,” Koziol says. Her research on the young women buried in Mound 72 was “a way of trying to humanize and personalize their stories.”

Gaining insights into the causes of violence matters today, according to Pérez. In addition to his work on ancient violence he’s studying the modern Mexican drug cartels’ practice of murdering people and leaving their mutilated bodies in public plazas or in front of police stations “to send a powerful message to rivals or police,” he says. The drug cartels consider this brutality to be an acceptable way to accomplish their goals.

To understand violence, according to Pérez, is “to understand the transformative powers of its use in social relations and cultural practices.” And the study of ancient violence gives context to its modern counterpart. “By looking for the social, political, and environmental mechanisms that sanctioned violence in the archaeological record,” Pérez says, “we can better understand the variables that can produce violence today, and thus try to limit its use.”

DAN FERBER is an Indianapolis-based science writer, a contributor to many magazines, and co-author of the book *Changing Planet, Changing Health: How Climate Change Threatens Our Health and What We Can Do About It*.



A Trail to Prehistory

The Conservancy saves a trailhead leading to an important Sinagua settlement.

A 1.3-acre triangle of land near Camp Verde in central Arizona was recently donated to the Conservancy by the McDonald family for permanent preservation. For decades the small parcel has served as the trailhead for pedestrian access to the Clear Creek Ruin Complex, which is owned by the U.S. Forest Service.

Clear Creek is the largest Tuzigoot-phase Sinagua settlement (A.D. 1250 to 1450) in the region. It's located on a limestone mesa with commanding views of the Verde Valley and the West Clear Creek drainage, and it consists of one main pueblo and a handful of other contemporaneous structures spread across three levels of the mesa. The ground floor of the settlement had at least 48 rooms and may have stood several stories high.

Researchers with the Museum



This trail leads to the Clear Creek Ruin Complex. The McDonald trailhead can be seen by the road in the upper-left of the photo.

of Northern Arizona documented an extensive network of cavates (dwellings carved into the rock face below the mesa) that are associated with the complex, which is the largest prehistoric habitation site in the Verde Valley. The trailhead preserve, which is about 1/2 mile from the site, contains an area with high concentrations of cultural material on the surface, suggesting a sub-surface structure may exist. A small, two-room Sinagua structure was previously excavated nearby when the road was widened.

The Verde Valley Archaeology Center, a non-profit preservation organization based in nearby Camp Verde, put the Conservancy in touch with the McDonald family earlier this year.

"The generous donation of land by the McDonald Family is a wonderful gift that will help with the future

preservation of the incredible site called the Clear Creek Ruin Complex," said Todd Bostwick, an archaeologist and executive director of Verde Valley. "The donation is a fine example of a local ranching family showing support for preserving the ancient heritage of the Verde Valley region."

With the help of Verde Valley, the Conservancy will create a long-term management plan for the preserve, build a fence around a trail leading to the ruin complex, and erect a sign acknowledging the McDonald family's donation. Verde Valley also plans to help the Conservancy with future projects in the area, including mapping and stabilization of the nearby Atkeson Pueblo Preserve on Oak Creek, and fencing of the Conservancy's Ottens Preserve on Sugarloaf Mountain.

—Tamara Stewart

CHAZ EVANS





Northernmost Chaco Canyon Outlier To Be Preserved

Carhart Pueblo holds clues to the broader Chaco regional system.



ERIN BAXTER

Lance Holly exposes the eroded bench and floor in the central kiva at Carhart's great house. The remains of two pilasters are still visible.

Situated in Utah near the Colorado border, Carhart Pueblo is the northernmost outlier of Chaco Canyon. The 67-acre site contains a Chacoan great house, a great kiva, road fragments, and a number of associated structures and features.

In addition to its location, Carhart is also notable because it's thought that the northern Chaco outliers were first built around 1080, but a recent tree ring date of A.D. 1017 was obtained from the site's great house, which suggests that it

could be one of the earliest Chacoan great houses built in the region.

Researchers are skeptical about the tree ring date because, due to the condition of the sample, they couldn't date the tree's outermost ring, which is necessary in order to get a precise age. Therefore it's possible that the tree dates to about 1030. Also, ceramics found during a surface survey of the site date to the early 1100s, suggesting the tree ring date could be an anomaly.

The tree ring date reveals two possible scenarios, said graduate student Erin Baxter, who investigated the site in 2008 as part of her Master's thesis at the University of Colorado in Boulder. The first scenario is that "the wood was carefully curated for almost 100 years and brought to Carhart to be put into the most sacred, central place on the site if or when it was built in the early 1100s."

The other possibility, according to Baxter, is that "if the tree was cut specifically for the purpose of construction of the kiva at Carhart, then it represents a tantalizing clue that Chaco Canyon—either its people, or its influence, or both—were present at the extreme northern edge the Mesa Verde Region 80 years before conventional wisdom purports them to be."

"Future research at Carhart could help us understand the Chacoan system in its entirety," said archaeologist James Judge, professor emeritus at Fort Lewis College and a leading Chaco expert. "The core of the Chacoan system is fairly well-understood, although there is an interesting debate going on currently which involves the question of whether Chaco was primarily a rituality or a social polity derived from the *altepetl* system in Mesoamerica. Steve Lekson is promoting the latter. (See "Chaco Through A Different Lens," page 12.) Apart from the specifics of this debate, I think it is interesting how such distinct interpretations might be manifest in the outlying Chaco system, particularly at sites as distant as Carhart. In other words, how was the Chacoan system, either ritual or sociopolitical, implemented far outside of the canyon?"

Judge stressed the need to know more about the Chacoan outliers; specifically, what benefits they may have received through membership in the Chacoan system, and to what extent those benefits were enhanced or diminished by their distance from Chaco.

"Both Lowry Pueblo, another Chacoan outlier some 20 miles southeast, and Carhart are a long way from Chaco, perhaps as much as two weeks of walking at 10 miles per day," Judge



Kellam Throgmorton (left) and Tucker Robinson document the beam from Carhart's kiva before dendrochronological sampling. This beam was probably cut around A.D. 1030.

said. "At that distance, was the ritual system and/or the sociopolitical system the same as it was in the canyon? And if different, were those differences augmented the further one got from the canyon? And as such, would Carhart be different from Lowry or other sites closer in? And are all Chacoan outliers alike, or are there major differences?"

The Chacoan system underwent significant change in the late A.D. 1000s and early 1100s when its center moved from the canyon north to the Aztec area. Carhart Pueblo's occupation throughout this period makes it a prime site for

addressing how such change might be manifested at the distant outliers.

The late David Breternitz, a renowned Southwestern archaeologist who was involved with Carhart Pueblo since the 1980s, called the Conservancy's attention to the site in 2010, and helped to initiate negotiations with the landowner, Jerry Carhart, who partially excavated the kiva in 1990. After the creation of a long-term management plan and site stewardship program for the preserve, the Conservancy will fence, backfill, and stabilize exposed portions of the site. —Tamara Stewart

CONSERVANCY Plan of Action

SITE: Carhart Pueblo

CULTURE AND TIME PERIOD:

Chaco and Mesa Verde Anasazi
(possibly A.D. 1030-1280)

STATUS: The Conservancy holds an option to purchase the site, due December 31, 2012.

ACQUISITION: The Conservancy needs to raise \$188,000.

HOW YOU CAN HELP: Please send contributions to The Archaeological Conservancy, Attn: Carhart Pueblo, 5301 Central Ave. NE, Ste. 902, Albuquerque, NM 87108-1530





Protect Our Irreplaceable National Treasures

acquisition

UNIVERSITY OF SOUTH FLORIDA

A Glimpse of a Major Transition

Herd Village could reveal information about the change from the Basketmaker III to the Pueblo I phase.



CHAZ EVANS

A sherd of black-on-white pottery that was found at the site.

The Herd Village Preserve is a late Basketmaker III - early Pueblo I - phase settlement (A.D. 750-900) located in San Juan County, in northwestern New Mexico. Archaeologist Alex Wesson brought the site to the Conservancy's attention in June of 2012, and with the gracious cooperation of the landowners Peggy and

George Herd, the Conservancy surveyed the property's archaeological remains.

This preliminary investigation revealed a concentration of weathered adobe adjacent to a depression that could be a proto-kiva or a pithouse. Surrounding the adobe is a lithic scatter as well as several concentrations of

plain grey ceramics and a smattering of black on white pottery. Herd's date was determined from the style of these ceramics.

Pueblo I sites represent a period of rapid demographic and organizational change that was occurring across southwestern Colorado, southeastern Utah, and northwestern New Mexico.



This piece of daub is a vestige of one of the village's aboveground structures.

It is believed that previously dispersed groups may have banded together to pool their labor and material resources. The aggregation of populations and the construction of centralized habitation structures punctuates the beginning of this new social organization.

Other indications of this change are seen in the transition from belowground pithouses to aboveground, multi-room, wattle and daub structures. These features likely had flat roofs, and the walls were constructed with vertically and horizontally woven branches and sticks that were packed with mud. By A.D. 750-900, pithouses were still in use, but they were beginning to be constructed deeper underground than

their Basketmaker III predecessors. These deeper pithouses are considered by some to be proto kivas.

Another change seen in the Pueblo I period is the intensification of farming techniques that includes the construction of reservoirs. Herd Village is located on a mesa top covered with piñon, juniper, and sagebrush. It is centrally located between several drainages and is in proximity to small canyon features filled with sediments that could have served as the loci for farmsteads. Research conducted within this part of the San Juan Basin has shown that the number of Pueblo I sites is relatively low compared to the number of sites in the

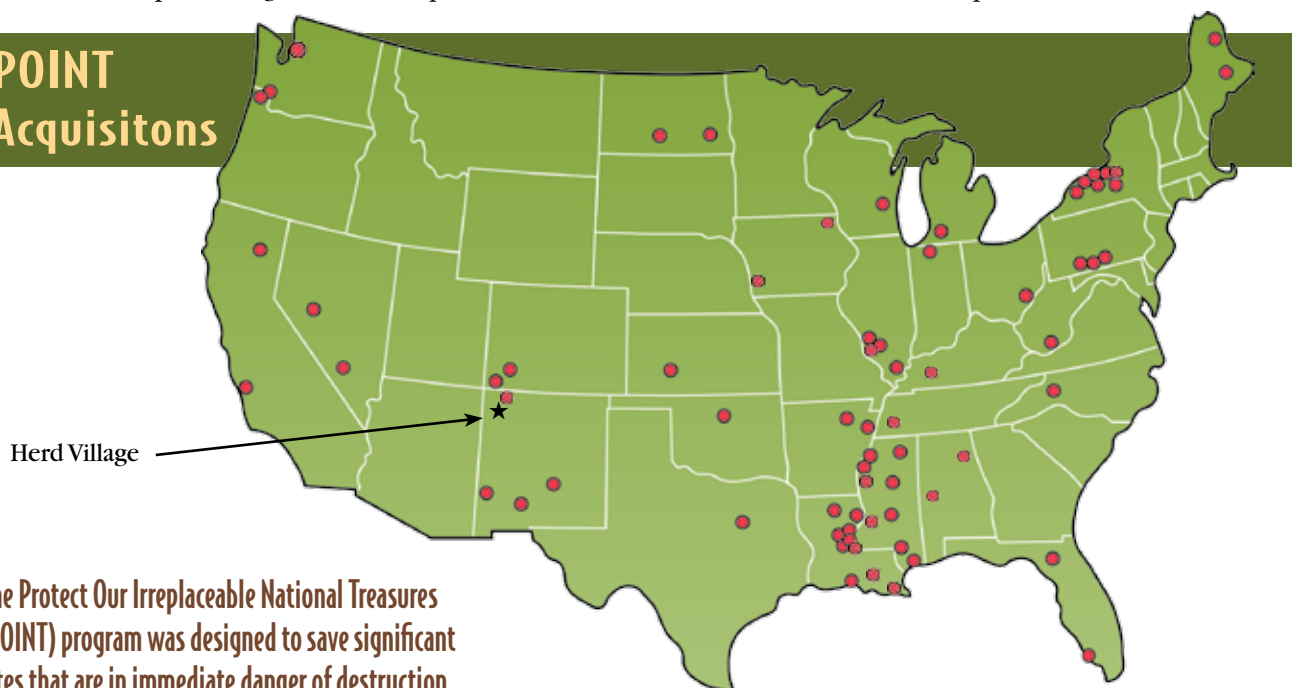
neighboring regions to the west.

This difference in site density may in part be linked to changing environmental conditions on the Colorado Plateau and the variability in rainfall. There is evidence indicating that precipitation was not only decreasing during the late A.D. 800s, but that it was becoming more sporadic. These small differences in precipitation occurred in each valley or drainage basin throughout the region and affected agriculture.

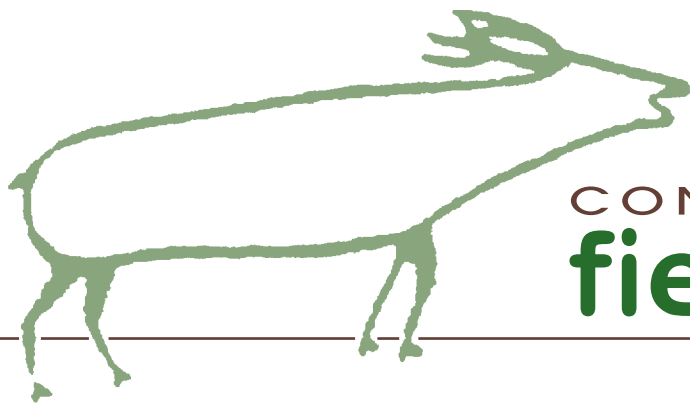
Pueblo I sites in this part of the San Juan Basin are positioned not only along well-watered drainages, but also on alluvial fans formed by intermittent streams and sediment filled canyons. The people farmed these areas in order to maximize their crop yield.

Herd Village has not been excavated and it has the potential to offer us details of the fascinating transition between the Basketmaker III and Pueblo I periods. —Chaz Evans

POINT Acquisitons



The Protect Our Irreplaceable National Treasures (POINT) program was designed to save significant sites that are in immediate danger of destruction.



CONSERVANCY field notes

Test Excavations at the Irwin Johnson Site

MIDWEST—During May and June of 2012 a crew from Minnesota State University-Moorhead excavated the Irwin Johnson site on the Sheyenne River in southeastern North Dakota. The fieldwork was done on land the Conservancy purchased in 2008 to preserve the Biesterfeldt site, an earth-lodge village and 18th-century Cheyenne settlement.

The Irwin Johnson site was subsequently identified during work on a river terrace about 10 feet below Biesterfeldt. The site is named after the former landowner who preserved Biesterfeldt prior to the Conservancy's purchase.

Prehistoric ceramics, stone artifacts, and animal bone fragments were recovered, and their dates span the Late Woodland (A.D. 800-1200) to early Northeastern Plains Village (after A.D. 1200) periods. The stone tools

include several small triangular points that probably date to late prehistoric times and two others that likely were produced during the Late Woodland period.

The researchers identified two types of Late Woodland ceramics that consist of small, fine-paste miniature vessels and plain-surface jars with dentate stamping in geometric patterns. These items resemble St. Croix Stamped ware, which is widespread in Minnesota but has not been previously identified in North Dakota.

Based on this evidence, the archaeologists hypothesize there were recurrent occupations beginning sometime in the latter part of the Late Woodland period and continuing on an intermittent, short-term basis into the Northeastern Plains Village period. No evidence for occupations relating to the Biesterfeldt site was identified.



Researchers excavate the Irwin Johnson site.

Gros Cap Cemetery Site Expanded

MIDWEST—The Conservancy expanded the Gros Cap Cemetery, a site it acquired in 1996. The Conservancy obtained an additional five acres from the Brown family, who own the surrounding land, to protect more archaeological resources.

This site is located near St. Ignace Michigan, right across the Mackinac Bridge at the tip of the Upper Peninsula in the Straits of Mackinac. Gros Cap is probably the oldest continuously used cemetery in the United States. It was begun in the late 17th century by Ottawa Indians. Maps of the region dating to the late 1600s reference an Ottawa settlement of 1,500 people.

The site was partially excavated in the late 1970s when US Highway 2 was being widened. Archaeologists from Michigan Technological University found a wide array of artifacts from stone projectile points and prehistoric ceramics to European trade goods such as glass beads, iron artifacts, rings, and copper bells. Many prehistoric human burials were found here, as well as midden pits and other features.

Part of the Gros Cap Archaeological District includes the Moran Township Cemetery, which is still in use today. There is also an adjacent habitation site known as the Campfire site that is part of this archaeological district. The entire district is listed on the National Register of Historic Places and is a very important site regionally as well as nationally. The Campfire site gives us a clear picture of village life of the Ottawa and how that changed

GEORGE HOLLEY

as white settlers moved in and began interacting with the natives. The Gros Cap Cemetery shows how burial

practices have changed and evolved for some 300 years, not only for European settlers but also indigenous peoples.

Lamb Spring Preserve Celebrates New Interpretive Display



NATHAN BOYLES

The cast of the mammoth skull and tusks is on display at the Lamb Spring site.

SOUTHWEST—A local grassroots support group known as the Lamb Spring Archaeological Preserve (LSAP) recently installed a new on-site exhibit featuring the cast of a juvenile mammoth and interpretive signs describing the history of excavations and the significance of the site, which is located near Denver, Colorado. The interpretive signs and display will enhance the free twice-monthly public tours of the preserve that run from spring through fall. The exhibit was prepared at the University

of New Mexico's Maxwell Museum of Anthropology under the direction of archaeologist E. James Dixon.

In 1995 the Conservancy acquired the 35-acre Lamb Spring site, which contains bone beds of extinct Ice Age animals, including over 30 Columbian mammoths as well as camels, horses, sloths, llamas, and wolves. The skull and tusks of one of the mammoths were originally exposed and reburied at the site by Dennis Stanford and the Smithsonian Institution in 1981. The

skull and tusks were re-excavated in 2002, and a full-sized cast was made of them in 2004 at the Denver Museum of Nature and Science.

In addition to the animal remains, the site contains spear points and bison bones from a hunt that took place at the spring sometime between 9,000 and 8,400 years ago. The artifacts left by humans indicate that people hunted and camped around the spring for the past 9,000 years, and possibly much longer.

LSAP is expanding public outreach to highlight the preserve's potential as an educational center for Douglas County and the Denver metropolitan area. LSAP offers students and the public an opportunity to view interpretive materials in their original setting in order to experience the process of scientific inquiry and discovery.

The Conservancy's acquisition of the Lamb Spring site was made possible in part by a Colorado Historical Fund grant administered through the Colorado Historical Society.

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August 4–10, 2013



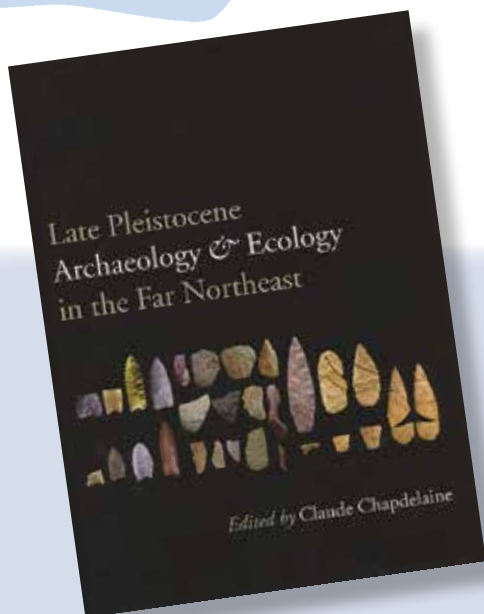
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Reviews



Late Pleistocene Archaeology & Ecology in the Far Northeast

Edited by Claude Chapdelaine

(Texas A & M University Press, 2012; 264 pgs., illus., \$68 cloth; www.tamupress.com)

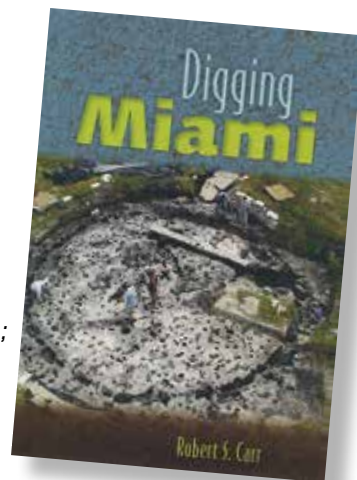
This fascinating study examines the first American occupation of the far Northeast—the peninsula between the Hudson and St. Lawrence Rivers comprising New York east of the Hudson, the six New England states, Quebec south of the St. Lawrence, and the Maritime Provinces. Until about 13,500 years ago, this area was still covered by glacial ice. As the ice slowly retreated humans moved in, leaving behind the distinctive Clovis fluted points and other evidence of their presence.

Claude Chapdelaine of the Université de Quebec brings together in this volume a group of distinguished scholars to present the latest data on the era, including many newly identified early sites. This was a hostile world, and these first Americans learned how to adapt to a harsh climate and limited resources as they moved into the region. Many scholars have been making important new finds in this area for the last few decades, and this fascinating information is presented in this nicely illustrated volume.

Digging Miami

By Robert S. Carr

(University Press of Florida, 2012; 352 pgs., illus., \$30 cloth; www.upf.com)



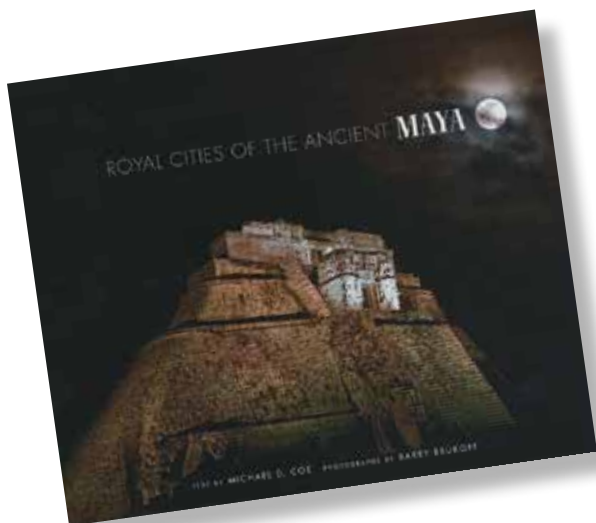
Miami was the last of America's large cities to get going. It was not incorporated until 1896, and seldom visited before that. But once development started, it grew with abandon, and a series of dedicated archaeologists sought to keep ahead of the bulldozers. In earlier times, Miami was home to several thousand Tequesta people and their predecessors dating back some 11,000 years. They occupied a rich locale between the Atlantic Ocean and the swamps of the Everglades. Travel by land was difficult, but the sea and the swamp provided abundant food and other resources.

Since 1978, archaeologist Robert Carr has been exploring and helping to preserve the ancient cultures of greater Miami. He was Dade County's first staff archaeologist. This volume tells his story and those of his successors in their race to recover knowledge in the face of unrelenting developmental pressure. Today, builders in Miami-Dade County must first look for the remains of ancient peoples and allow archaeologists to study them before yielding to the demand for new condos, but that was not always the case.

Despite all of the development, Miami-Dade County has produced some rather spectacular archaeological finds. The Cutler site, discovered in 1985, revealed a rich midden and a large burial mound. Early European sites have also yielded substantial discoveries about those intrepid, pre-air-conditioning settlers.

The most sensational find was the discovery in 1998 of what is now known as the Miami Circle, located near the mouth of the Miami River on Biscayne Bay. As developers were demolishing an outdated apartment complex, archaeologists discovered a rich midden and then, to their amazement, a large circle cut into the limestone bedrock. A media stampede soon followed, as did absurd speculations about the nature of the site. Finally, science and reason prevailed and the site was identified as a Tequesta center. The State of Florida and Miami-Dade County provided \$26.7 million, and the two-acre site was permanently preserved and opened to the public—the most expensive archaeological preservation project in the nation's history.

Digging Miami tells the exciting story of the many battles to understand and preserve the city's rich archaeological heritage. In doing so, Carr makes a strong case for historic preservation in a booming urban area. He also makes a strong case for the wisdom of working closely with developers and governmental officials to preserve the past as part of the modern legacy.



Royal Cities of the Ancient Maya

Text by Michael D. Coe Photographs by Barry Burkoff

(Vendome Press, 2012; 224 pgs., illus., \$50 cloth;
www.vendomepress.com)

If you're looking for a great Christmas gift for a person who loves the ancient Maya, this is it. Noted Maya scholar Michael Coe and renowned photographer Barry Burkoff have joined forces to create a coffee table book that is a feast for the eyes and an excellent discussion of the latest Maya archaeology.

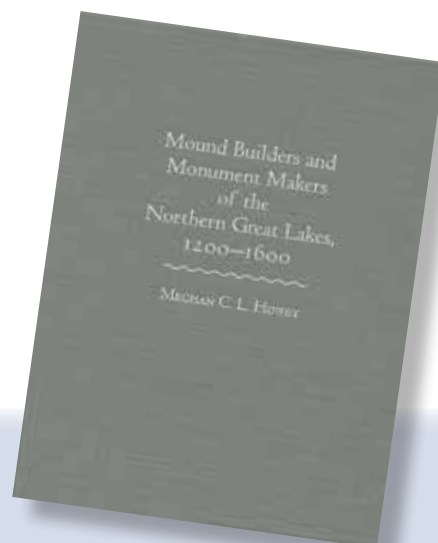
Coe, who is a professor emeritus at Yale and the author of many Maya studies, deftly leads the reader through the entire history of the Maya, from their origins in the earlier Olmec culture, to their peak in the ninth century A.D. This was followed by a decline lasting some 500 years that terminated with the Spanish conquest. Of course the Maya did not simply disappear. Some eight million Maya still inhabit southern Mexico, Guatemala, Belize, and northern Honduras, and they still speak a variety of Maya languages.

The focus of this tome is the great Maya cities of the region. Coe arranges the text around the chronological development of these great centers with their pyramids, temples, and palaces. Burkoff complements the text with vivid photographs of the Maya architecture and environment. The story begins in earnest with a description of the great pre-Classic center of El Mirador in the forests of northern Guatemala. It may be the largest of all the Maya cities and the first to fall into ruin, only to be superseded by the rise of the magnificent Classic centers of the central lowlands. Tikal, Calakmul, Yaxchilán, Palenque, and others are vividly described as their great kings rise and fall. Here the photographs give a sense not only of their architectural grandeur, but of the rise of Maya art as well, especially at the spectacular frescos of Bonampak. Some of the lesser known and visited centers featuring Chenes- and Rio Bec-style architecture are also included.

As Coe makes clear, there was no single Maya collapse, but a series of declines that occurred from the southern lowlands to the northern Yucatán. As great centers like Palenque and Copán faded away, they were replaced by equally great centers of the Puuk world like Kabah and Uxmal. Finally the last great Maya centers are built at Chichén Itzá and Mayapán in the far northern Yucatán.

This is not an in depth study of the Maya culture, but rather a brief and graphic description of a great culture as seen through its greatest cities. As a commanding introduction to the Maya world, it is unsurpassed.

— Mark Michel



Mound Builders and Monument Makers of the Northern Great Lakes, 1200-1600

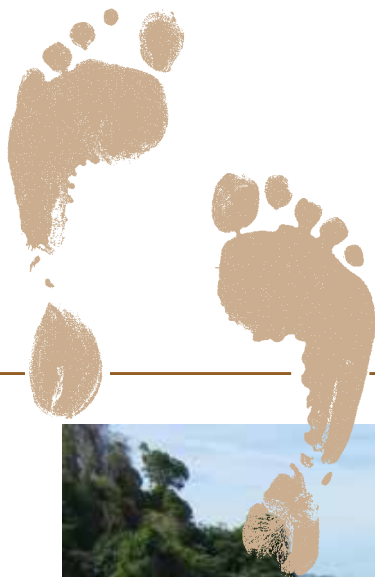
By Meghan C.L. Howey

(University of Oklahoma Press, 2012;
320 pgs., illus., \$45 cloth;
www.oupres.com)

This is the first study of mounds, earthworks, and other earthen monuments in northern Michigan, an area somewhat outside of the more intense and better studied mound building areas of the Midwest and South. These constructions have often been considered to be isolated finds and not connected to the late prehistoric period of the indigenous tribes.

Archaeologist Meghan C.L. Howey of the University of New Hampshire has broken new ground in this survey and study of these mounds. She reviews old interpretations and presents new data to show that the mounds are part of a regional ritual landscape. She convincingly argues that these are monuments of an equalitarian society that flourished just prior to European contact.

Rejecting colonial accounts as largely unreliable and biased against the existing tribes (the mound builders were said to be almost anyone but Native Americans), Howey uses modern archeological methods to seek the facts. This is an important regional study into an important area of American archaeology that has often been ignored.



The Archaeological Conservancy

Expeditions



MARK MICHEL

Palenque's magnificent ruins make it a popular destination. The city's palace is seen in the upper right of this photo.

Maya of Chiapas and Tabasco

When: March 13-23, 2013

Where: Mexico

How Much: \$2,945 per person (\$425 single supplement)

This tour takes us to some of the more out-of-the-way but spectacular Maya ruins in southern Mexico that flourished between A.D. 300 and 900. We begin in the tropical lowlands and end in the fabulous highlands of Chiapas among the modern Maya people. We'll see tremendous pyramids, unbelievable sculptures and murals, and modern arts and crafts.

We begin our adventure with a visit to the major Olmec site of La Venta with its great earthen pyramid. We will then visit Comalcalco, Palenque, Bonampak, and Yaxchilán. Then we leave the tropical lowlands for a long climb into the Chiapas mountains to the large Maya center of Toniná. The site is dominated by its acropolis, which rises in terraces and buildings some 233 feet up the side of a steep hill. We'll continue climbing to reach the colonial-Indian town of San Cristóbal de las Casas, where we'll spend two nights. We'll then visit the charming Tzotzil Maya villages of San Juan Chamula and Zinacantán.

Colonial Chesapeake

When: April 21 – 28, 2013

Where: Maryland, Virginia

How Much: \$2,795
(\$375 single supplement)

From early European settlements to later colonial capitals, the Chesapeake Bay region has played an important role in the founding and development of our nation. Join the Conservancy as we spend a week exploring the area's rich and diverse colonial history and archaeology.

Our exciting journey will begin in Baltimore, Maryland, and will take us from Historic St. Mary's City, Maryland's 17th-century capital, to its current capital in Annapolis. We will travel to Jamestown, Virginia, the first permanent English colony in North America, and then to the historic Mt. Vernon Estate of George Washington. Along the way we'll spend three nights in Colonial Williamsburg, Virginia, and visit important 17th- and



Jamestown attracts thousands of visitors each year. Archaeologists are excavating the original fort, which was rediscovered in 1996.

18th-century sites in the area. During our adventure we will be joined by noted Chesapeake archaeologist Donald Linebaugh of the University of Maryland, as well as other local scholars that will share their expertise and explain how archaeology has assisted them in interpreting the region's past.



San Juan River Trip

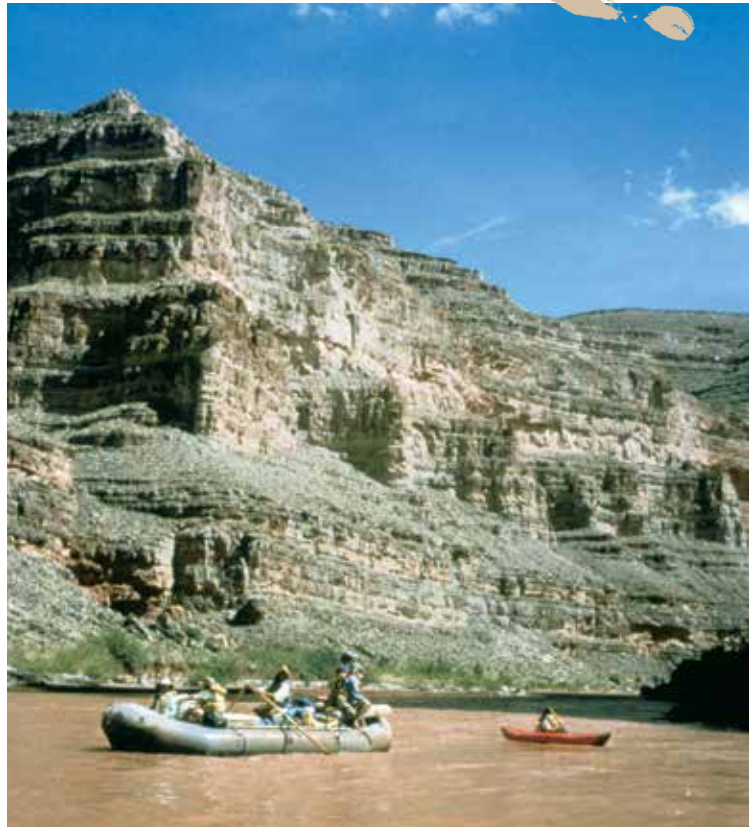
When: May 18 – 25, 2013

Where: Utah

How Much: \$1,895 per person
(\$175 single supplement)

Join our river adventure through the heartland of the Anasazi world. From the vantage point of Utah's San Juan River, you'll experience one of the most scenic regions of the Southwest.

We'll begin our adventure with two full days of site visits on land, then we'll board our boats and float down the San Juan River for four days, stopping often to visit Anasazi ruins accessible only by river. At night we'll camp under the spectacular Southwestern sky.



The San Juan River tour features beautiful scenery and Anasazi Ruins.



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The Archaeological Conservancy would like to thank the following individuals, foundations, and corporations for their generous support during the period of August through October 2012. Their generosity, along with the generosity of the Conservancy's other members, makes our work possible.

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Since the inception of the Conservancy's Living Spirit Circle in 2002, participation has grown to over 100 members. These dedicated members have included the Conservancy in their long-term planning to ensure that America's past will always have a future.

This elite group is open to those who wish to make a lasting contribution by including the Conservancy in their will or estate plans, or by making a life-income gift such as a charitable gift annuity. The Conservancy would like to thank the following Living Spirit Circle members for their thoughtfulness and generosity.

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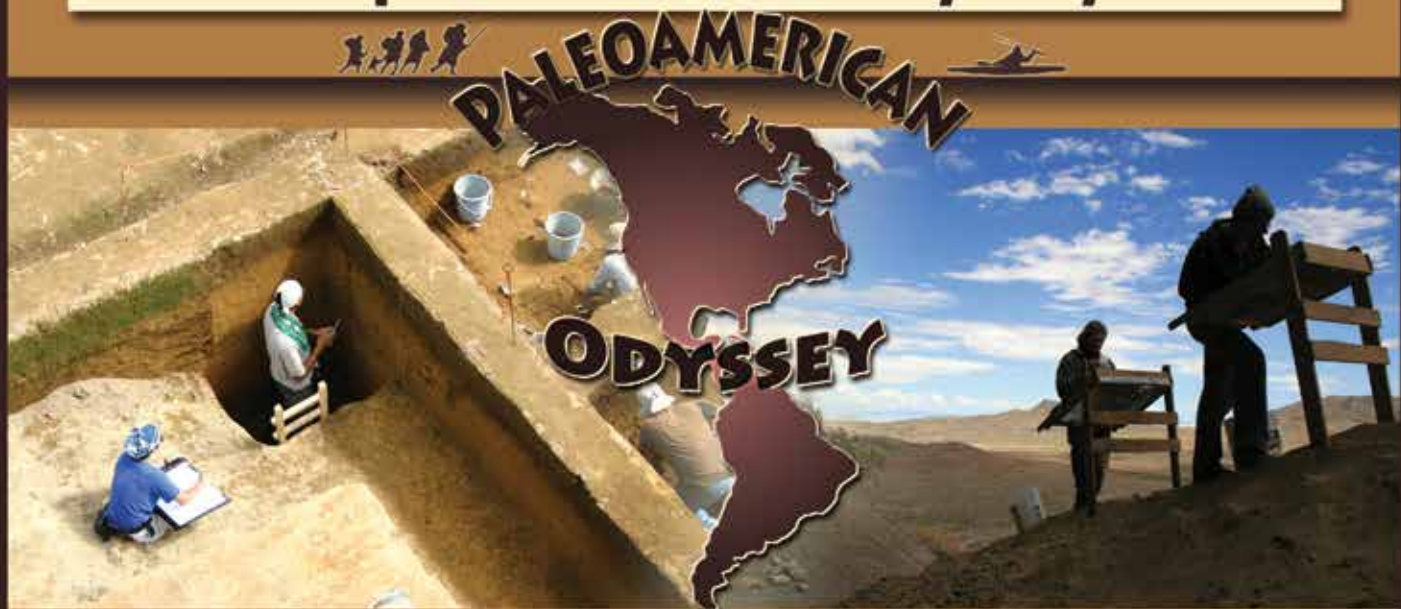
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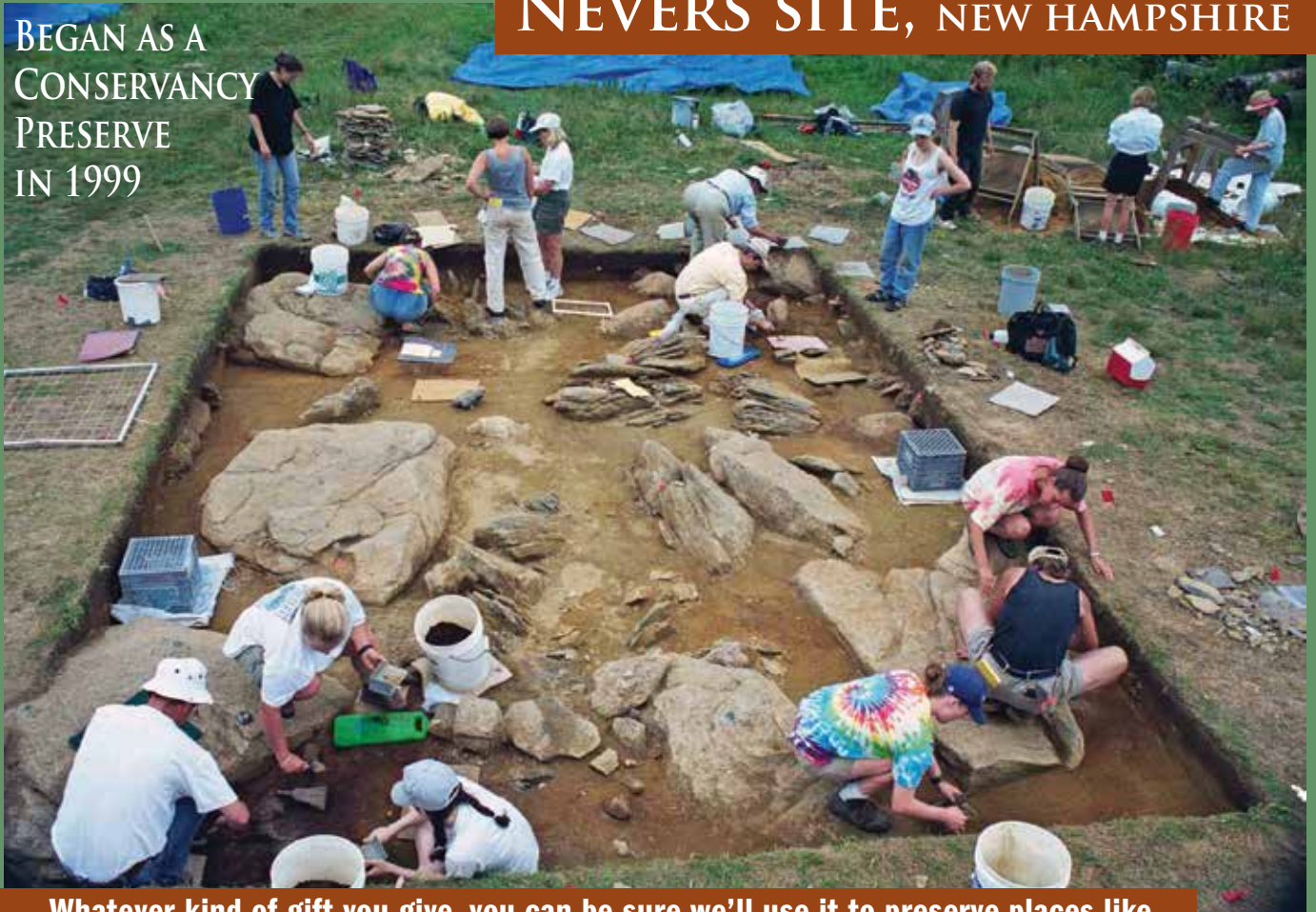
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